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**B.Sc. – I (Semester – I) Examination, 2015
ENGLISH COMPULSORY (CGPA Pattern)
On Track – English Skills for Success**

Day and Date : Wednesday, 1-4-2015
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

N.B. : 1) *All questions are compulsory.*
2) *Figures to the right indicates full marks.*

1. Rewrite the following sentences by choosing correct alternative : 14
- 1) What did the policeman look like ?
 - a) Uniformed and frail and short
 - b) Uniformed and well-built
 - c) Dressed in ordinary clothes and frail and short
 - d) Dressed in ordinary clothes and well-built
 - 2) When the writer invited her to stay with her for a while, Miss Krishna agreed _____
 - a) Reluctantly
 - b) Shyly
 - c) Readily
 - d) With little enthusiasm
 - 3) The name of the psychologist who developed the IQ test was _____
 - a) Dr. Sigmund Freud
 - b) Carl Jung
 - c) Robert Smith
 - d) Mr. Binet
 - 4) The word 'intelligence' is derived from the Latin word _____
 - a) Intellegere
 - b) Intellectual
 - c) Intellect
 - d) None of these
 - 5) Krishna's first name was _____
 - a) Maya
 - b) Sheela
 - c) Mala
 - d) Nergis
 - 6) What did the policeman on the beat constantly do ?
 - a) Twirl his stick
 - b) Interrogate people on his beat
 - c) Smoke a Cigar
 - d) Unlock doors



- 7) What does 'shining loads' mean _____
- a) An unmarried woman's wrist b) bunches of bangles
c) The flame of a marriage fire d) Sunlit corn
- 8) The words Kiltartan cross refer to _____
- a) A famous place in Ireland b) The battlefield
c) An Irish Church d) None of the above
- 9) The poem 'Bangle Sellers' is written by _____
- a) W. B. Yeats b) Sarojini Naidu
c) John Milton d) W. B. Keats
- 10) The speaker of the poem 'An Irish Airman Foresees His Death' is _____
- a) Irish Airman or Pilot b) Farmer
c) Sailor d) None of the above
- 11) Can you give me _____ money ?
- a) Any b) Some c) Little d) A few
- 12) A man is known by _____ company he keeps.
- a) the b) a
c) an d) none of the above
- 13) The woman _____ the car is my neighbour.
- a) of b) in c) on d) under
- 14) What is the capital _____ Switzerland ?
- a) of b) at c) on d) from

2. Answer **any seven** of the following questions :

14

- 1) Describe the weather in the story 'After Twenty Years'.
- 2) What sort of relationship did Bob and Jimmy share ?
- 3) What did Miss Krishna claim to be the 'Panacea for all (her) ills' ?
- 4) How can you define 'intelligence' ?
- 5) What are the areas in which the computer is much faster than human brain ?
- 6) What colours of bangles are suitable for a maiden's wrists ?
- 7) How does the speaker imagine he will die ?
- 8) Whom are the purple and gold-flecked grey bangles meant for ?



3. A) Write short note on **any two** of the following : **8**
- 1) Jimmy Wells
 - 2) Miss Krishna's character
 - 3) The merits of artificial intelligence.
- B) Answer **any three** of the following questions briefly : **6**
- 1) Describe the different types of bangles which the bangle-sellers carry.
 - 2) How does the poet describe the faithful wife who is now middle-aged ?
 - 3) What is the Irish airman's attitude towards the war he is fighting in ?
 - 4) What do you think is the speaker's attitude towards his 'poor' countrymen ?
4. 1) Write an essay on 'Impact of Mobiles on the lives of the Youth Today'. **14**
- OR
- 2) Write paragraphs of **six to eight** sentences on **each** of the following :
- 1) Terrorism : Irrational and Inhuman
 - 2) Solar energy.
5. Read the following passage and make notes of it. Use an appropriate title for your notes : **14**
- There are different forms of environmental pollution. Air pollution is caused by the burning of coal and oil. It can damage the earth's vegetation and cause respiratory problems in humans. A second type of pollution is noise pollution. It is the result of the noise of aircraft and heavy traffic. Further, loud music is also a cause of noise pollution, which has been seen to affect people's hearing and give them severe headaches and high blood pressure. Another source of pollution is radioactivity, which occurs when there is a leak from a nuclear power station. Radioactivity is a deadly pollutant, which kills and causes irreparable harm to those exposed to it. Land and water pollution is caused by the careless disposal of huge quantities of rubbish, sewage and chemical wastes. Pollution of rivers and seas kills fishes and other marine life and also becomes the cause of water-borne diseases. Land pollution, on the other hand, Poisons the soil, making the food grown in it unfit for consumption.
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B.Sc. – I (Semester – I) (CGPA Pattern) Examination, 2015
ELECTRONICS – Paper – I
Fundamentals of Electronics, Digital Fundamentals

Day and Date : Tuesday, 21-4-2015

Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- Instructions:** 1) **All** questions are **compulsory**.
2) Figures to the **right** indicates **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.
4) **Use** of logtable and calculator is **allowed**.
5) **Two** sections should be written in **two separate** answer books.

SECTION – I

1. Select **correct** alternatives for the following :

5

- i) Parallel resonant circuit is also known as _____ circuit.
 - a) Aceptor
 - b) Rejector
 - c) High pass filter
 - d) Low pass filter
- ii) In step up transformer
 - a) No. of turns of primary winding are greater than No. of turns of secondary winding
 - b) No. of turns of secondary winding are greater than No. of turns of primary winding
 - c) No. of turns of primary winding are equal to No. of turns of secondary winding
 - d) None of the above
- iii) When AC is applied to inductor then
 - a) current will lead applied voltage
 - b) current will lag behind applied voltage
 - c) current will in phase with applied voltage
 - d) none of these

P.T.O.



- iv) Impedance parameters are same as _____ circuit parameters.
a) short b) close c) open d) hybrid
- v) Four capacitors, each of $20\mu\text{f}$ are connected in parallel, the equivalent capacitor is _____ μf .
a) 100 b) 80 c) 0.2 d) 20

2. Answer **any five** of the following : **10**

- i) What is two port network ? What are its types ?
- ii) Give classification of inductor.
- iii) A sinusoidal signal has maximum value of 10 mV. What is average and RMS voltage ?
- iv) What are Z-parameters ? Give their formulae.
- v) Write the colour code of $1\text{ K}\Omega$ resistor with 10% tolerance.
- vi) Write short circuit resistance of TT network.
- vii) Define equivalent network.

3. A) Write short notes on **any two** of the following : **10**

- i) Relay
- ii) Super position theorem
- iii) Mesh analysis.

B) Answer **any one** of the following : **10**

- i) Explain series resonance circuit and derive formulae for resonance frequency and quality factor.
- ii) Explain H-parameters for two port network and draw its equivalent circuit.

SECTION – II

1. Select **correct** alternative for the following : **5**

- 1) $(1101)_2$ binary number is equivalent to its hexadecimal number.
a) A b) B c) C d) D
- 2) Gray code of 1011 is
a) 1110 b) 1010 c) 1011 d) 1100
- 3) IC 7432 is
a) OR gate b) AND gate c) NOR gate d) XOR gate



4) In boolean algebra $A + 1$ is

- a) 1
- b) A
- c) \bar{A}
- d) None of these

5) Full adder adds how much bits at a time

- a) 1
- b) 2
- c) 3
- d) 4

2. Answer **any five** of the following :

10

- i) What is octal number system ?
- ii) State DeMorgan's 2nd theorem.
- iii) Draw the logic diagram for the logic equation $Y = \bar{A} \cdot B + A \cdot \bar{B}$.

iv) Solve $\begin{matrix} 1 & 1 & 1_2 \\ + & 0 & 1 & 1_2 \end{matrix}$.

- v) State the OR laws
- vi) Convert the 11011001_2 into its equivalent Hexadecimal number.
- vii) Draw the symbol NAND gate. Write its truth table for 2 inputs.

3. A) Write short notes on **any two** of the following :

10

- i) Hexadecimal number system. Converts the $(64)_{10}$ decimal number to equivalent hexadecimal number.
- ii) Construct K map for OR gate.
- iii) Show that $A + A \cdot B = A$.

B) Answer **any one** of the following :

10

- i) Explain Full adder using Half adder.
 - ii) State different number systems. Hence convert the $(54)_{10}$ and $(68)_{10}$ into equivalent binary number.
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B.Sc. – II (Semester – III) (New) Examination, 2015
GEOLOGY (Paper – V)
Optics and Mineralogy

Day and Date : Thursday, 28-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Draw neat diagrams wherever necessary.**
3) **Figures to the right indicate full marks.**

1. Fill in the blanks with correct answer from the given option : **10**
- 1) A group of silicate minerals which contain discrete $[\text{SiO}_4]$ tetrahedra is called as _____
a) Nesosilicate b) Sorosilicate c) Inosilicate d) Cyclosilicate
 - 2) _____ of a mineral is directly related to the refractive index.
a) Cleavage b) Relief c) Form d) Alteration
 - 3) _____ substance transmit light with unequal velocity in all direction.
a) Isotropic b) Anisotropic
c) Isotropic and Anisopopic d) None of these
 - 4) The tremolite mineral is found only in _____ rock.
a) Igneous b) Sedimentary c) Metamorphic d) None of these
 - 5) Nephelene mineral belonging to _____ group.
a) Chlorite b) Garnet c) Clay d) Feldspathoid
 - 6) The composition of lusite is _____
a) $\text{KAl Si}_2\text{O}_6$ b) $\text{NaAl Si}_2\text{O}_6$ c) $\text{CaAlSi}_2\text{O}_6$ d) $\text{CaNa Si}_2\text{O}_6$
 - 7) The hardness of hornblende is _____
a) 2 to 3 b) 5 to 6 c) 7 to 8 d) 8 to 9
 - 8) The inosilicate is also called as _____
a) Ring silicate b) Sheet silicate c) Orthosilicate d) Chain silicate
 - 9) All uniaxial mineral posses _____ extension.
a) Straight b) Oblique
c) Straight and oblique d) None of these
 - 10) The mineral _____ is in pyroylene group.
a) Tremolite b) Kyanite c) Chlorite d) Diopside



2. Answer **any five** of the following : **10**
- 1) Colour
 - 2) Optical properties of biotite
 - 3) Alteration of mineral
 - 4) Twinning
 - 5) Cleavage
 - 6) Anisotropism.
3. A) Answer **any two** of the following : **6**
- 1) Mode of occurrence of chlorite minerals.
 - 2) Physical properties of garnet.
 - 3) Polymorphism.
- B) Explain with suitable diagram, the behaviour of light under petrological microscope. **4**
4. Answer **any two** of the following : **10**
- 1) Structure and physical properties of pyroxene group of minerals.
 - 2) Describe phyllosilicate and tectosilicate.
 - 3) Describe crystalline and cryptocrystalline silica.
5. Answer **any two** of the following : **10**
- 1) Describe chemistry and optical properties of feldspar group.
 - 2) Describe optical properties under PPL (Plane Polarised Light).
 - 3) Explain the physical properties and occurrence of feldspathoid group.
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B.Sc. II (Semester – III) (New) Examination, 2015
MICROBIOLOGY (Paper – V)
Cytology, Physiology of Bacteria and Virology

Day and Date : Thursday, 28-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) *All questions are compulsory.*
2) *Figures to the right indicate marks.*
3) *Draw a neat labelled diagram wherever required.*

1. Choose the correct answers from given alternatives : 10

1) When the bacterial cells are suspended in a hypertonic solution, the effect exerted is called

- a) Plasmolysis
b) Plasmoptysis
c) Autolysis
d) Photolysis

2) _____ is an example of thermophilic organism.

- a) Bacillus psychrophilus
b) E.Coli
c) Thermus aquaticus
d) Klebsiella pneumoniae

3) Small solute molecules like H₂O, CO₂, O₂ enters in cell by the way of

- a) Passive diffusion
b) Group translocation
c) Facilitated diffusion
d) Active transport

4) _____ of the following linkages join NAG and NAM of bacterial peptidoglycan.

- a) β (1 – 4) b) α (1 – 4) c) β (1 – 6) d) α (1 – 6)

5) Carboxysomes are involved in _____ activity.

- a) CO₂ evolution
b) Photosynthesis
c) CO₂ fixation
d) Nitrification



6) Clostridium titani is an example of _____ spore forming organism.

- | | |
|------------------------|--------------------|
| a) Aerobic | b) Anaerobic |
| c) Facultative aerobes | d) Microaerophilic |

7) Microorganisms bear a hydrostatic pressure of

- | | | | |
|----------|----------|------------|------------|
| a) 1 atm | b) 3 atm | c) 100 atm | d) 200 atm |
|----------|----------|------------|------------|

8) _____ is responsible for giving resistance to the endospore.

- | | |
|-------------------------|------------------|
| a) Dipicolinic acid | b) Peptidoglycan |
| c) Diaminopimellic acid | d) Ribosome |

9) _____ enzymes are responsible for joining reaction.

- | | |
|--------------------|-----------------|
| a) Ligases | b) Transferases |
| c) Oxidoreductases | d) Lyases |

10) In _____ phages adsorption to the host takes place with the help of tail and tail fibres.

- | | | | |
|--------|--------|-------------------|----------------|
| a) HIV | b) TMV | c) T ₄ | d) Hepatitis B |
|--------|--------|-------------------|----------------|

2. Answer **any five** of the following :

10

- i) What is carboxysomes ?
- ii) Define generation time.
- iii) Define simple diffusion.
- iv) Define sex pili.
- v) Enlist types of organisms on the basis of temperature with examples.
- vi) What is fermentation ?



3. A) Answer **any two** of the following questions in brief. **6**
- i) Explain direct microscopic count.
 - ii) With labelled diagram give structural properties of TMV.
 - iii) Write an account on PHB granules.
- B) Give an account on structure and function of flagella. **4**
4. Answer **any two** of the following : **10**
- i) Explain diauxic growth.
 - ii) Write an account on homolactic and heterolactic fermentation.
 - iii) Explain sporulation process.
5. Answer **any two** of the following : **10**
- i) Explain active transport mechanism.
 - ii) Describe cell wall of gram positive bacteria.
 - iii) Describe lytic cycle of T₄ bacteriophage.
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B.Sc. – II (Semester – III) (New) Examination, 2015
ELECTRONICS
Paper – VI : Pulse and Switching Circuits

Day and Date : Friday, 29-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) Draw **neat diagrams wherever necessary.**
3) Figures to the **right indicate full marks.**
4) **Use of log table and calculator is allowed.**

1. Select correct alternative from the following : **10**
- i) Linear sweep is obtained with
 - a) constant capacitor
 - b) constant voltage source
 - c) constant resistor
 - d) constant current source
 - ii) The bistable multivibrator has
 - a) two quasi-stable states
 - b) two stable states
 - c) one stable state
 - d) one quasi-stable state
 - iii) Schmitt trigger is used to convert the sine wave into
 - a) sawtooth wave
 - b) triangular wave
 - c) cosine wave
 - d) square wave
 - iv) In application of IC 555 as a sequential timer, it is used as
 - a) A stable multivibrator
 - b) Monostable multivibrator
 - c) Bistable multivibrator
 - d) Schmitt trigger
 - v) As per functional block diagram of IC 555, the trigger and threshold levels can be adjusted externally through _____ pin.
 - a) threshold
 - b) trigger
 - c) discharge
 - d) control voltage



- vi) In a monostable multivibrator using IC 555, the timing components are $1\text{ K}\Omega$ and $0.1\ \mu\text{F}$, then the pulse width obtained will be
- a) 0.1 msec. b) 10 msec.
 c) 100 msec. d) None of the above
- vii) In a Schmitt trigger circuit, the UTP is + 3.0 V and LTP is + 1.5 V, then the hysteresis voltage will be
- a) 4.5 V b) 2.5 V
 c) 1.5 V d) 1.0 V
- viii) The average output voltage of negative clipper circuit will always be
- a) negative b) positive
 c) zero d) infinity
- ix) In order to design IC 555 as square wave generator, the condition for charging through R_A and R_B , and discharging through R_B should be maintained such that
- a) $R_A \gg R_B$ b) $R_A \ll R_B$
 c) $R_A = R_B$ d) $R_A = 0, R_B = \infty$
- x) Flip-Flop is another name for
- a) A stable multivibrator b) Monostable multivibrator
 c) Bistable multivibrator d) Schmitt-trigger circuit

2. Answer **any five** of the following :

10

- i) What is non-linear wave-shaping ? Give one example.
- ii) Draw the circuit of series positive clipper.
- iii) Show the timing waveforms of a stable multivibrator using IC 555, across timing capacitor and output.
- iv) Draw a typical trigger circuit used in bistable multivibrator.
- v) Give the role of comparators in the functional block diagram of IC 555.
- vi) Draw labelled pin diagram of IC 74121.

3. A) Attempt **any two** of the following :

6

- i) Draw the circuit diagram of monostable multivibrator using NAND gates.
- ii) Draw the circuit of RC differentiator and show its response to square-wave input.
- iii) Draw the circuit diagram of astable multivibrator using IC 555.

B) Explain the application of IC 555 as Voltage Controlled Oscillator (VCO).

4



4. Attempt **any two** of the following : **10**
- i) Explain the action of Schmitt trigger circuit. Show the waveforms.
 - ii) With a neat circuit diagram, explain the operation of collector-coupled astable multivibrator. Draw the input-output waveforms.
 - iii) Draw the circuit diagram, input-output waveform of a biased series positive clipper and explain its action.
5. Attempt **any one** of the following : **10**
- i) With neat labelled circuit diagram, explain the working of Miller Sweep generator. Draw the waveforms and write the applications also.
 - ii) Draw the functional block diagram of IC 555 timer and explain the function of each pin. Why the name is given IC 555 ?
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B.Sc. II (Semester – III) (New) Examination, 2015
GEOLOGY (Paper – VI)
Structural Geology

Day and Date : Friday, 29-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Draw neat diagrams wherever necessary.**
3) **Figures to the right indicate full marks.**

1. Fill in the blanks with correct answer from the given option :

10

- 1) Offset stream are found along _____ fault.
a) Strike slip fault b) Graben
c) Normal fault d) Reverse fault
- 2) The term _____ is used to indicate the relative displacement of a formerly adjacent point on opposite side of fault.
a) Dip b) Slip
c) Rake d) None of these
- 3) _____ types of joints observed in volcanic igneous rock.
a) Columnar b) Mural
c) Sheet d) None of these
- 4) _____ in which joint sets strike parallel to the dip direction of rock.
a) Strike joints b) Oblique joints
c) Dip joints d) None of these
- 5) Change in the size and shape under the influence of stress is known as
a) Formation b) Dilation
c) Distortion d) Brittleness



4. Answer **any two** of the following : 10

- 1) What is lineation ? Describe any two types of lineation.
- 2) Describe symmetrical and asymmetrical fold.
- 3) What is fault ? Explain normal and reverse fault.

5. Answer **any two** of the following : 10

- 1) Explain genetic classification of joints.
 - 2) Explain the concept of deformation.
 - 3) Explain the parts of fold.
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B.Sc. – II (Semester – III) Examination, 2015
MICROBIOLOGY (Paper – VI) (New)
Microbial Genetics

Day and Date : Friday, 29-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Draw labelled diagrams wherever necessary.**

1. Rewrite the following sentences by choosing correct answer : **10**
- 1) The deoxyribose sugar is _____ type of sugar.
a) triose b) tetraose c) pentose d) hexose
 - 2) A single giant molecule of DNA represents genetic material of _____
a) bacteria b) protozoa c) algae d) fungi
 - 3) The gene as a unit of function is called _____
a) recon b) muton c) exon d) cistron
 - 4) The coding sequences of gene are termed as _____
a) intron b) exon c) cistron d) recon
 - 5) The number of nucleotides present in one turn of A form of DNA is _____
a) $9\frac{1}{3}$ b) 10 c) 11 d) 8
 - 6) 2-aminopurine is an analog of _____ base.
a) guanine b) adenine c) cytosine d) thymine
 - 7) The process of naked, soluble DNA transfer is known as _____
a) conjugation b) transformation
c) transfection d) transduction
 - 8) _____ cuts DNA molecule in dark repair mechanism.
a) polymerase b) exonuclease
c) endonuclease d) photolyase



9) Maleness in bacteria is because of the presence of _____ plasmid.

- a) R c) Col c) Ti d) F

10) Tautomerism is the cause of _____ mutation.

- a) spontaneous b) reverse c) back d) silent

2. Write **any five** : **10**

- 1) Describe genotype.
- 2) What are interrupted genes ?
- 3) What is a missense mutation ?
- 4) Describe non-overlapping nature of genetic code.
- 5) What is photoreactivation ?
- 6) What is transfection ?

3. A) Write **any two** : **6**

- 1) Write properties of DNA.
- 2) Describe semiconservative mode of replication.
- 3) Describe effect of acridine dyes and U.V. rays on DNA.

B) Give an account of types of mutations. **4**

4. Write **any two** : **10**

- 1) Write on properties of genetic code.
- 2) Give an account of transformation.
- 3) Describe process of conjugation.

5. Write **any two** : **10**

- 1) Give an account of plasmids.
 - 2) Write on DNA repair mechanisms.
 - 3) Write on mechanism of mutagenesis caused by base analogs, alkylating agents.
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B.Sc. (Part – II) (Sem. – III) (Old) Examination, 2015
CHEMISTRY (Paper – V)
Organic Chemistry

Day and Date : Tuesday, 19-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Draw neat labelled diagrams and give equations wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of log table or calculator is allowed.**
5) **Atomic weights : H = 1, C = 12, N = 14, O = 16, Cl = 35.5, I = 127, Ag = 108.**
6) **Spectroscopic chart is supplied.**

1. Choose the correct alternative for **each** of the following : **10**
- i) Reduction of Ketone by hydrazine and strong base is called as _____
- a) Clemmensen reduction
 - b) Catalytic hydrogenation
 - c) Wolf-Kishner reduction
 - d) Perkin's reaction
- ii) Ultraviolet spectroscopy is mainly used for determination of _____
- a) Molecular weight
 - b) Functional group
 - c) Conjugation
 - d) Unsaturation
- iii) Malic acid on reduction with hydroiodic acid gives _____
- a) Oxalic acid
 - b) Succinic acid
 - c) Maleic acid
 - d) Citric acid



iv) When sodium phenoxide is treated with CO_2 gas at 150°C under pressure gives salicylic acid. This reaction is known as _____

- a) Reimer-Tiemann reaction
- b) Gatterman reaction
- c) Kolbe's reaction
- d) Perkin's reaction

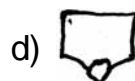
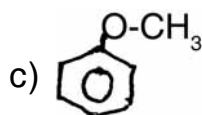
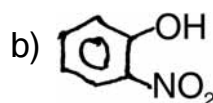
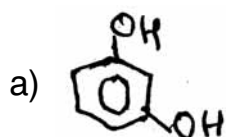
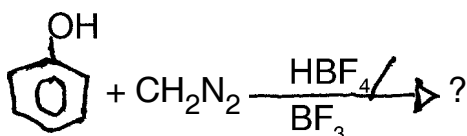
v) Glycerol on oxidation with con. HNO_3 gives _____

- a) Glyceric acid
- b) Mesoxalic acid
- c) Oxalic acid
- d) Malic acid

vi) Benzene diazonium chloride on reduction with SnCl_2/HCl gives _____

- a) Phenyl cyanide
- b) Phenyl isocyanate
- c) Hydrazine
- d) Phenyl hydrazine

vii) What is the product of following reaction ?

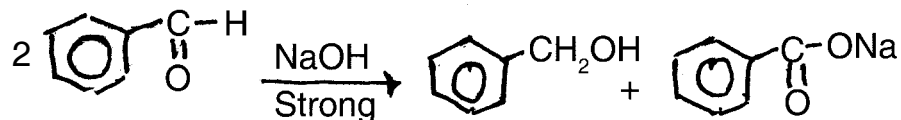


viii) Which type of electronic transition requires least energy _____

- a) $\sigma \rightarrow \sigma^*$
- b) $\pi \rightarrow \pi^*$
- c) $n \rightarrow \sigma^*$
- d) $n \rightarrow \pi^*$



ix) Name the following reaction



- a) Cannizzaro's reaction
- b) Perkin's reaction
- c) Aldol condensation
- d) Wolf-Kishner reduction

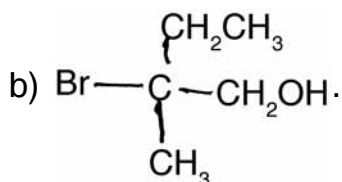
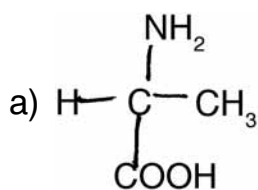
x) In D and L nomenclature system the standard reference molecule taken as

- a) Lactic acid
- b) Glyceraldehyde
- c) Acetaldehyde
- d) Glycerol

2. Answer **any five** of the following :

10

- i) What is action of heat and NH_3 on phthalic acid ?
- ii) Give uses of succinic acid.
- iii) What is action of aq. KI and CuBr on Benzene diazonium chloride ?
- iv) Give principle and reactions of methoxy group estimation by Zeisel method.
- v) Assign R or S configuration of following compounds :



vi) Explain the terms with examples :

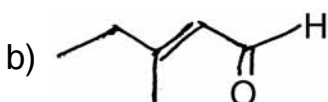
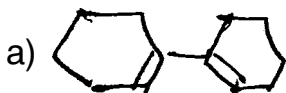
- a) Chromophore
- b) Auxochromes.



3. A) Answer **any two** of the following :

6

i) Calculate the λ_{\max} of the following dienes and enones by using Woodward Fieser rules.



ii) Give synthesis of congo red.

iii) Draw saw horse, Fischer and Hermans projection formulae for n-butane molecule.

B) In Zeisel's method 0.035×10^{-3} Kg of methoxy compound having molecular weight 108, produced 0.077×10^{-3} Kg of AgI. Calculate the percentage and number of methoxy groups present in compound.

4

4. Answer **any two** of the following :

10

i) Draw the various conformations of ethane. Explain their stability with the help of energy profile diagram.

ii) Discuss different types of electronic transitions involved in UV-spectroscopy.

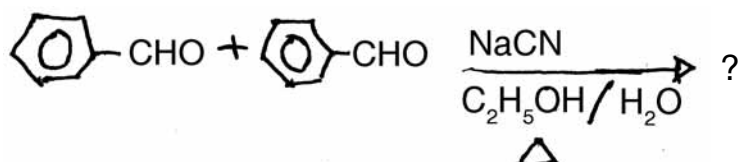
iii) What is pinacol formation ? Discuss pinacol-pinacolone rearrangement reaction with mechanism.

5. Answer **any two** of the following :

10

i) Discuss Reimer-Tiemann reaction with mechanism.

ii) Complete the following reaction and suggest the mechanism. Give its name.



iii) Give any two methods of preparations of cinnamic acid. What is action of Br_2 and oxidation on it ?



Spectroscopic Chart

Woodward's – Fieser's rules for calculating ultraviolet absorption maxima

A) For substituted dienes (Ethanol Solution)

No.	Basic Value	λ_{max} (nm)
1)	Acyclic and heteroannular dienes	214
2)	Homoannular dienes	253
3)	Addition for each substituent	
	a) – R alkyl (including part of carbocyclic ring)	5
	b) – OR (alkoxy)	6
	c) – Cl, – Br	5
	d) – OCOR (acyloxy)	0
	e) – NR ₂ , (N – alkyl)	60
	f) – SR (S – alkyl)	30
	g) – CH = CH – additional conjugation i.e. extending conjugation	30
	h) If one double bond is exocyclic to one ring	5
	i) If exocyclic to two rings simultaneously	10

B) Rules for α, β – Unsaturated Enones (Ethanol Solution)

No.	Basic Value	λ_{\max} (nm)
1)	Ketones : $ \begin{array}{c} \beta \quad \alpha \\ \quad \\ -C = C - CO - \\ \quad \end{array} $	
	a) Acyclic or 6 – membered ring	215
	b) 5 – membered ring	202
2)	Aldehydes $ \begin{array}{c} \quad \\ -C = C - CHO \end{array} $	207
3)	Extended Conjugation	30
	$ \begin{array}{c} \delta \quad \gamma \quad \beta \quad \alpha \\ \quad \quad \quad \\ -C = C - C = C - CO - \text{etc.}, \\ \quad \quad \quad \end{array} $	
4)	Homodiene component	39
5)	a) If one double bond is exocyclic to one ring	5
	b) If exocyclic to two rings simultaneously	10
6)	Addition for substituents	

**Substituents****Position**

		α	β	γ	δ
a)	– R alkyl (including part of carbocyclic ring)	10	12	18	18
b)	– OR (alkoxy)	35	30	17	31
c)	– OH (hydroxy)	35	30	–	50
d)	– SR (thioether)	–	85	–	–
e)	– Cl (chloro)	15	12	–	–
f)	– Br (bromo)	25	30	–	–
g)	– OCOR (acyloxy)	6	6	–	6
h)	– NH ₂ , – NHR, – NR ₂	–	95	–	–

Solvent correction

	Solvent	
a)	Ethanol	0
b)	Methanol	0
c)	Dioxan	– 5
d)	Chloroform	– 1
e)	Ether	– 7
f)	Water	+ 8
g)	Hexane	– 11
h)	Cyclohexane	– 11



Seat No.	
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**B.Sc. (Part – I) (Semester – I) Examination, 2015
Paper – I : PSYCHOLOGY (CGPA Pattern)
General Psychology and Human Development**

Day and Date : Tuesday, 21-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :** 1) *All questions are **compulsory**.*
2) *Section I and Section II should be write in **separate** answer book.*
3) *Figures to the **right** indicate **full** marks.*

**SECTION – I
(General Psychology)**

1. Fill in the blanks :

5

- 1) The _____ wake cycle is a circadian rhythm.
A) sleep B) learn
C) body D) mind
- 2) The cortex is divided into _____ sections.
A) 3 B) 2
C) 4 D) 10
- 3) The _____ is in some ways similar to a triage nurse.
A) thalamus B) limbic
C) pons D) RF
- 4) The _____ is the specialized cell in the nervous system.
A) neuron B) axon
C) soma D) glial cells
- 5) The _____ perspective focus on memory, IQ ; perception.
A) cognitive B) behavioural
C) humanistic D) modern

2. Answer the following **any five** :

10

- 1) How many goals of psychology ?
- 2) Who was the founder of behavioural perspective ?
- 3) State any four modern perspectives of psychology.

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- 4) Define psychology.
 - 5) Define experiment.
 - 6) Define consciousness.
3. Write short notes (**any two**) : **10**
- 1) Humanistic perspective.
 - 2) Case studies method.
 - 3) The neural impulse.
4. A) Explain the types of psychological professionals. **10**
- OR
- B) Explain the theory of hypnosis.

SECTION – II
(Human Development)

1. Multiple choice. **5**
- 1) The peer groups are important for _____ development.
a) adulthood b) adolescence
c) childhood d) any other
 - 2) The formal operational stage is the _____ stages of piagets cognitive development.
a) first b) second
c) four d) five
 - 3) AIDS was first diagnosed of Belleue – Newyork University Medical Center in _____ years.
a) 1979 b) 1975
c) 1978 d) 1985
 - 4) Stornborge has suggested _____ different component of love.
a) Two b) Three
c) Six d) Eight
 - 5) According to _____ human sexuality is the underlying basic of human behaviour.
a) Freud b) Allport
c) Jung d) Erikson



2. Answer **any five** of the following :

10

- 1) What is Cyber space ?
- 2) What is self – concept ?
- 3) Define cholesterol.
- 4) What are the three stages of sexuality ?
- 5) When does puberty starts ?
- 6) Define the phenomenon secular trends.

3. Write short notes (**any two**) :

10

- 1) The choice of food in early adulthood.
- 2) The function of peer-groups in adolescence.
- 3) Schale's stages of development.

4. Answer **any one** of the following :

10

A) Explain the psychological impact of physical changes in adolescence.

OR

B) What is sexual behaviour ? Describe the stages of sexuality during adolescence.



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B.Sc. – II (Semester – III) (Old) Examination, 2015
COMPUTER SCIENCE (Paper – V)
Object Oriented Programming Using C++

Day and Date : Tuesday, 19-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory.**
2) A figure to the **right** indicates **full marks.**

1. Choose correct alternatives :

10

- 1) C++ is pure object oriented language.
a) True b) False
- 2) _____ operator cannot overloaded by using friend function.
a) New b) < c) = d) >
- 3) The common task done by constructor is _____
a) Overloading b) Multiplying c) Initializing d) None of these
- 4) How many instances of an abstract class have ?
a) One b) Two c) Three d) None of these
- 5) Which of the following facility provides the use of one class object inside another class ?
a) Encapsulation b) Abstraction c) Composition d) Inheritance
- 6) Which of the following cannot be used with the keyword 'virtual' ?
a) Constructor b) Destructor c) Class d) Member function
- 7) Which of the following keywords cannot be used with friend function ?
a) Static b) Virtual c) Const. d) Both b) and c)
- 8) The members declared under _____ visibility mode are hidden from non-member function.
a) Private b) Protected
c) Both a) and b) d) Friend



- 9) _____ is not built in data type in C++ language.
a) void b) float c) int d) class
- 10) C++ does not support for _____ type of parameter passing technique.
a) Pass by value b) Pass by reference
c) Pass by pointer d) None of these

2. Answer **any five** of the followings : **10**
- 1) What is C++ ? Listout its applications.
 - 2) List out different rules to overload the operators.
 - 3) Write the significance of 'new' and 'delete' operator.
 - 4) How 'inline' function differ from other function ?
 - 5) What is Data Abstraction ?
 - 6) Write use of 'this' pointer along with its characteristics.
3. A) Answer **any two** of the followings : **6**
- 1) What is constructor ? List out its characteristics.
 - 2) Explain 'virtual base class' in details.
 - 3) What is importance of 'access specifier' ? Explain all access specifiers in C++.
- B) Write a program that demonstrates the use of friend function. **4**
4. Answer **any two** of the followings : **10**
- 1) Write a program that demonstrates the use-of array of object.
 - 2) What is polymorphism ? Explain runtime and compile time polymorphism.
 - 3) Write a program to implement hierarchical inheritance.
5. Answer **any two** of the followings : **10**
- 1) Write a program which counts total number of vowels in string by using parameterized constructor.
 - 2) Explain the concept of virtual functions.
 - 3) Write a short notes on 'Type conversion'.
-



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B.Sc. – II (Semester – III) Examination, 2015
CHEMISTRY
Inorganic Chemistry (Paper – VI) (Old)

Day and Date : Wednesday, 20-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions:**
- 1) **All questions are compulsory.**
 - 2) Draw **neat** diagram and give equations **wherever necessary.**
 - 3) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for the following and rewrite the sentences. **10**
- 1) Optical isomerism is also called as _____ isomerism.
a) Cis-trans
b) Mirror-image
c) Geometrical
d) Symmetric
 - 2) DMG is _____ dentate chelating agent.
a) mono
b) bi
c) tetra
d) hexa
 - 3) Ammonia molecule is
a) Arrhenius acid
b) Lewis acid
c) Lewis base
d) None of these
 - 4) The substance which is present in large amount in solution is known as _____
a) solute
b) solvent
c) dilute solution
d) conc. solution
 - 5) Effective atomic number of Co in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ is _____
a) 36
b) 28
c) 35
d) 54



- 6) Classification of chelating agent is made on the basis of _____
- a) Oxygen atom b) Nitrogen atom
c) Number of donor groups d) Carbon atoms
- 7) Most of the transition elements are _____
- a) Diamagnetic b) Paramagnetic
c) Ferromagnetic d) None of these
- 8) According to Pearson hard acid prefer to bind with
- a) Hard base b) Hard acid
c) Soft base d) Soft acid
- 9) The solvents which donate as well as accept protons are known as _____ solvents.
- a) Acidic b) Basic
c) Amphoteric d) Aprotic
- 10) Highest oxidation state +7 is shown by _____
- a) Hafnium b) Copper
c) Zinc d) Manganese

2. Answer **any five** of the following :

10

- i) Define coordination number with example.
- ii) Give IUPAC name of $K_4[Fe(CN)_6]$.
- iii) Give analytical applications of DMG.
- iv) Why water is called universal solvent ?
- v) Give merits of Lewis concept.
- vi) Write the electronic configuration of zinc and cadmium.



3. A) Answer **any two** of the following : **6**
- i) Explain the term coordination sphere.
 - ii) Discuss the role of liquid ammonia as a solvent.
 - iii) Give structural requirements of chelate formation.
- B) Define acids and bases on the basis of Lewis theory and give classification of Lewis acids and bases with suitable example. **4**
4. Write notes on **any two** of the following : **10**
- i) Geometrical isomerism with CN = 4.
 - ii) Classification of bidentate chelating agent.
 - iii) Magnetic behaviour of first transition series elements.
5. Answer **any two** of the following : **10**
- i) Explain formation $[\text{Ni}(\text{CN})_4]^{2-}$ on the basis of VBT and comment on hybridisation, magnetic behaviour and stability.
 - ii) Give the names, symbol and electronic configuration of 3d-block elements.
 - iii) Explain in detail colour behaviour of first transition series elements.
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B.Sc. – II (Semester – III) (Old) Examination, 2015
COMPUTER SCIENCE (Paper – VI)
RDBMS

Day and Date : Wednesday, 20-5-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions: 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Choose **correct** alternatives : 10
- 1) Triggers accept parameters
a) True b) False
 - 2) _____ is a set of SQL commands used to alter table commands.
a) DDL b) DML
c) DQL d) All of above
 - 3) Which of the following SQL commands can be used to insert the record into the table ?
a) Modify b) Select c) Insert d) Delete
 - 4) _____ is the function used to calculate maximum of the column.
a) Maximum () b) Min ()
c) Minimum () d) Max ()
 - 5) DBMS supports client/server architecture
a) True b) False
 - 6) Procedure returns a value, while function does not return value
a) True b) False
 - 7) RDBMS means
a) Record Data Base Management System
b) Resource Data Base Management System
c) Relational Data Base Management System
d) None of these



- 8) _____ constraint can only be applied at column level.
 - a) Not null
 - b) Primary key
 - c) Foreign key
 - d) All of above
- 9) SQL provides programming techniques of conditional checking.
 - a) True
 - b) False
- 10) _____ function calculates only one output by many inputs.
 - a) Arithmetic function
 - b) Conversion function
 - c) Aggregate function
 - d) None of these

2. Answer **any five** of the following : **10**

- 1) What are the role of DBA ?
- 2) Write the general syntax of For loop in PL/SQL.
- 3) Define “self join”.
- 4) State any four DML commands.
- 5) Define DBMS.
- 6) State string functions used in SQL.

3. A) Solve **any two** of the following : **6**

- 1) Explain operators used in SQL.
- 2) What are the components of DBMS ?
- 3) Explain order by and group by clause with example.

B) Write a PL/SQL block to test given number is prime or not. **4**

4. Solve **any two** of the following : **10**

- 1) What are the difference between procedure and function used in SQL ?
- 2) Explain types of cursors.
- 3) Explain exception handling in PL/SQL.

5. Solve **any two** of the following : **10**

- 1) Define cursor and explain open, fetch and close the cursor.
 - 2) Explain the terms “packages”.
 - 3) Explain the difference between SQL and PL/SQL.
-



Seat No.	
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B.Sc. – II (Sem. – III) (Old) Examination, 2015
PHYSICS (Paper – V)
General Physics and Sound

Day and Date : Thursday, 21-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Use of logarithmic table or calculator is allowed.**
4) **Neat diagrams must be drawn wherever necessary.**

1. Select correct alternative from the following : **10**
- i) Acceleration due to earth's gravity _____ with increasing earth's crust.
a) increases b) decreases c) remains const. d) none of these
 - ii) According to Newton's law of gravitation, force is directly proportional to the product of
a) distances b) velocities c) masses d) areas
 - iii) The change in plane of rotation of a body is called
a) Nutation b) Precession c) Rotation d) Gyration
 - iv) The precessional motion of a body caused by gravitational torque is called
a) gyroscope b) microscope c) telescope d) oscilloscope
 - v) In flat spiral spring the plane of each spring is _____ to the axis of cylinder of spring.
a) parallel b) perpendicular c) circular d) inclined at 45°
 - vi) The C.G.S. Unit of viscosity is
a) Kg/ms b) gm.cm/s c) N.S./m² d) poise
 - vii) One tenth of Bel is called
a) Decibel b) Microbel c) Kilobel d) gmbel



- viii) Decay of sound energy in a hall is
a) constant b) linear c) exponential d) zero
- ix) For making the hall acoustically good, the reverberation time must be
a) small b) large c) zero d) optimum
- x) Searle's viscometer is used for determine the viscosity of
a) highly viscous liquid b) low viscous liquid
c) any liquid d) all of these

2. Answer **any five** of the following : **10**

- i) Explain the corrections required in the Cavendish method.
- ii) State applications of gyroscopic motion.
- iii) Define bending moment.
- iv) What is coefficient of viscosity ? State its S.I. Unit.
- v) What is musical sound ?
- vi) What is transducer ?

3. A) Answer **any two** of the following : **6**

- i) Draw neat diagram of Cavendish method to determine gravitational constant.
- ii) Calculate the critical velocity of a rolling disc of radius 3.75 m where $g = 10 \text{ m/s}^2$.
- iii) What do you mean by
a) neutral surface b) plane of bending c) neutral axis

B) How mass of sun is determined ? **4**

4. Answer **any two** of the following : **10**

- i) Obtain equation of the period of gyroscope.
- ii) Discuss Rankin's method to determine viscosity of gas.
- iii) Derive Sabine's formula for reverberation of time.

5. Answer **any one** of the following : **10**

- i) Obtain an expression for Young's modulus of the material of flat spiral spring.
 - ii) What is transducer ? State characteristics of transducer and explain moving coil loudspeaker.
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Seat No.	
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B.Sc. – II (Semester – III) Examination, 2015
BIOCHEMISTRY (Paper – I) (Old)
Biomolecules

Day and Date : Thursday, 21-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Figures to the **right** hand side indicate **full** marks.
3) Write biochemical reactions **wherever** necessary.

1. Write following sentences selecting most correct answer from given options : **10**

- 1) _____ polysaccharide has unbranched structure.
a) Cellulose b) Amylopectin c) Glycogen d) Lactose
- 2) _____ test is used to identify sugars.
a) Ninhydrin b) Osazone c) Biuret d) Reduction
- 3) Scleroproteins are also called as _____ proteins.
a) albumins b) proteans c) fibrous d) immunoglobulins
- 4) _____ proteins contain DNA associated with them.
a) Phospho b) Nucleo c) Chromo d) Glyco
- 5) Lactate dehydrogenase enzyme belongs to _____ class of enzymes.
a) isomerases b) lyases
c) oxidoreductases d) ligases
- 6) Many digestive enzymes possess _____ specificity.
a) Optical b) Geometrical c) Sterio d) Group
- 7) Beriberi is caused due to the deficiency of _____ vitamin.
a) pantothenic acid b) niacin
c) thiamin d) nicotinamide



- 8) _____ coenzyme contains riboflavin in its structure.
- a) NAD⁺ b) FAD
c) Pyridoxal phosphate d) Coenzyme A
- 9) Monoterpene contains _____ carbon atoms in its structure.
- a) 5 b) 10 c) 15 d) 20
- 10) Waxes are formed by esterification of long chain fatty acids with
- a) glycerol b) cholesterol
c) phosphate group d) long chain monohydric alcohols
2. Answer **any five** from below : **10**
- 1) Compare the structures of maltose and sucrose.
2) What are acidic amino acids ? Give two examples.
3) What are peptones ? How are they formed ?
4) Describe group transferase enzymes.
5) Draw a diagram of rhodopsin cycle.
6) How are micelles formed ?
3. A) Attempt **any two** : **6**
- 1) With structural formulae explain – amino sugars.
2) Illustrate α -helical structure of proteins.
3) Discuss about saturated fatty acids.
- B) Write an account of isoenzymes with suitable example. **4**
4. Answer **any two** : **10**
- 1) Describe the role of pantothenic acid as a part of coenzyme A.
2) Discuss about conjugated proteins.
3) What are coenzymes ? How they help the catalysis by enzymes ?
5. Attempt **any two** from below : **10**
- 1) Write an account of pentoses and hexoses.
2) Explain induced fit hypothesis of enzyme catalysis.
3) Discuss about terpenes and carotenes.
-

Seat
No.

B.Sc. – II (Sem. – III) (Old) Examination, 2015
PHYSICS (Paper – VI)
Optics

Day and Date : Friday, 22-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** i) **All questions are compulsory.**
ii) **Figures to the right indicate full marks.**
iii) **Use of log table or calculator is allowed.**
iv) **Neat diagrams must be drawn whenever necessary.**

1. Select the correct alternative from the following : 10

i) He-Ne laser consist of a mixture of Helium and Neon in ratio _____ placed inside a discharge tube.

- a) 5 : 1 b) 10 : 1 c) 15 : 1 d) 20 : 1

ii) In 1960 _____ produced He-Ne gas laser.

- a) Ali Javan b) Einstein c) Maiman d) Newton

iii) _____ is optically inactive.

- a) Cane sugar b) Fruit sugar c) Nicotine d) Calcite

iv) The Resolving power of prism is _____ proportional to the length of the prism.

- a) Inversely b) Directly c) Not d) None of above

v) According to modified Rayleigh criterion, the two spectral lines are said to be just resolved if the intensity at the dip is _____ times the intensity of either of maxima.

- a) $\frac{\pi}{8}$ b) $\frac{8}{\pi}$ c) $\frac{\pi^2}{8}$ d) $\frac{8}{\pi^2}$

vi) A_{21} , B_{12} , B_{21} are _____ coefficients.

- a) Einstein's b) Huygen's c) Newton's d) Maiman's



- vii) In case of Michelson's interferometer concentric circular fringes are obtained when M_1 and M_2^1 are _____ to each other.
- a) Parallel b) Perpendicular c) Inclined d) None of the above
- viii) The two glass plates in Michelson's interferometer are inclined to the incident beam direction at
- a) 90° b) 60° c) 30° d) 45°
- ix) An optical system has _____ Nodal points.
- a) 6 b) 3 c) 4 d) 2
- x) In Fresnel's diffraction, the area of each half period zone is
- a) $4\pi b\lambda$ b) $3\pi b\lambda$ c) $2\pi b\lambda$ d) $\pi b\lambda$

2. Answer **any five** of the following :

10

- i) Define lateral and axial magnification.
- ii) What is meant by resolution and resolving power of an optical instrument.
- iii) What is modified Rayleigh criterion for resolution ?
- iv) What is Holography ?
- v) Define quarter and Half wave plate.
- vi) What is double refraction ?

3. A) Answer **any two** of the following :

6

- i) A 20% sugar solution is taken in a polarimeter tube of length 20 cm rotates the plane of polarization of the light of wavelength 6000 \AA through 24° . Calculate the specific rotation of sugar.
- ii) Define principal points and principal planes for a lens system. State the properties of the principal plane.
- iii) Explain superiority of Fabry Perot interferometer over Michelson's interferometer.

B) What should be the minimum number of lines in a plane diffraction grating which will just resolve the lines of wavelength 5890 \AA and 5896 \AA , in the first order of the spectrum ?

4



4. Answer **any two** of the following : **10**
- i) Describe the construction and working of Ruby laser.
 - ii) Describe polarimeter experiment to determine the specific rotation of an optically active solution.
 - iii) Explain the use of Michelson's interferometer in
 - a) determination of the wavelength of monochromatic light
 - b) determination of the thickness of thin transparent plate.
5. Answer **any one** of the following : **10**
- i) Derive an expression for Lagrange's and Helmholtz laws.
 - ii) What is zone plate ? How is it prepared ? Explain how a zone plate acts like a lens having multiple focii. Derive an expression for its focal length.
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B.Sc. – II (Semester – III) Examination, 2015
BIOCHEMISTRY (Paper – II) (Old)
Biochemical Techniques

Day and Date : Friday, 22-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right hand side indicate full marks.**
3) **Draw labelled diagrams wherever necessary.**

1. Write following sentences selecting most correct answer from the given options. **10**
- 1) Sephadex gel is prepared from a polysaccharide _____ from bacteria.
a) Glycogen b) Amylose c) Amylopectin d) Dextrin
 - 2) The ratio of amount of solute retained in stationary phase to the amount of same solute in mobile phase under same condition is called
a) Rf value b) Partition coefficient
c) Distribution ratio d) Adsorption coefficient
 - 3) Lymphocytes from _____ of sensitized mouse are used to produce hybridoma cells.
a) Liver b) thymus c) Spleen d) Bone marrow.
 - 4) DNA finger printing is used for
a) Forensic gene typing b) Bacterial gene typing
c) DNA sequencing d) Production of DNA probes
 - 5) _____ is used for production of alcohol using immobilised cell techniques.
a) E.Coli b) Saccharomyces cereviceae
c) Corynebacterium simplex d) Aspergillus oryzae
 - 6) In spectrophotometer _____ converts light signal to electrical signal.
a) Galvanometer b) Diagonal mirror
c) Photocell d) Mercury lamp
 - 7) The technique used for blot transfer of RNA is called _____ blotting technique.
a) Western b) Southern c) Northern d) Eastern

P.T.O.



- 8) Sodium dodesyl sulphate-polyacrylamide gel (SDS-PAGE) electrophoresis is used for separation of
a) DNA b) RNA c) Proteins d) Lipids
- 9) _____ is not an intellectual property.
a) Trade mark b) Trade secrete c) Copy right d) House
- 10) DNA polymerase from _____ is not used for polymerase chair reaction.
a) E.Coli b) Thermophillus aquaticus
c) Pyrococcus furiosus d) Thermococcus literolis

2. Attempt **any five** from below : **10**
- 1) Explain the process of staining of proteins after starch gel electrophoresis.
 - 2) Discuss the principle of partition chromatography.
 - 3) State and explain Lambert's law.
 - 4) What is the role of glutaraldehyde in enzyme immobilization by intermolecular cross linking of enzymes ?
 - 5) Differentiate between Western blotting and Southern blotting techniques.
 - 6) What is void volume in gel permeation chromatography ? What is its significance ?
3. A) Answer **any two** from below : **6**
- 1) Describe the detectors used in HPLC.
 - 2) How is the molecular weight of protein determined using SDS-PAGE technique ?
 - 3) Discuss the limitations of colorimetric analysis.
- B) Draw a labelled diagram of construction of colorimeter instrument. **4**
4. Attempt **any two** : **10**
- 1) Discuss in detail about patents.
 - 2) Illustrate the hybridoma technology for the production of antibodies.
 - 3) Write an account of Northern blotting technique.
5. Answer **any two** : **10**
- 1) Describe immobilisation of enzyme by covalent binding method.
 - 2) Explain the process of preparation of plate for SDS-PAGE.
 - 3) Discuss various applications of polymerase chain reaction.
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Seat No.	
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B.Sc. – II (Semester – III) (Old) Examination, 2015
STATISTICS (Paper – V)
Continuous Probability Distribution – I

Day and Date : Saturday, 23-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative.

10

- 1) If X and Y are independent r.v.'s. Then the mgf of sum is $(X + Y)$ will be equal to
 - a) sum of their mgf
 - b) product of their mgf
 - c) both a) and b)
 - d) none of these
- 2) If $F_{X,Y}(x, y)$ be c.d.f. of bivariate random variable (X, Y) , then $F_{X,Y}(\infty ; \infty) =$
 - a) 0
 - b) 1
 - c) ∞
 - d) none of these
- 3) If $X \sim U(0, 1)$; then $Y = -2 \log_e X$ follows
 - a) Exponential distribution
 - b) Binomial distribution
 - c) Poisson distribution
 - d) None of these
- 4) If X is a continuous r.v. with pdf $f(x) = \begin{cases} kx & ; 0 \leq x \leq 1 \\ 0 & ; \text{ow} \end{cases}$. Then K must be
 - a) 1
 - b) 2
 - c) 0
 - d) none of these
- 5) If X follows exponential distribution with parameter θ , then mean of X will be
 - a) $\frac{1}{\theta}$
 - b) θ
 - c) $\frac{1}{\theta^2}$
 - d) none of these



3. a) Attempt **any two** of the following : 6

i) A continuous random variable X has pdf $f(x) = \begin{cases} 3x^2 & ; 0 \leq x \leq 1 \\ 0 & ; \text{ow} \end{cases}$

find variance of X .

ii) Define probability density function of a continuous r.v. X . Also state their properties.

iii) The p.d.f. of X is given by

$f(x) = \begin{cases} 2x & ; 0 \leq x \leq 1 \\ 0 & ; \text{ow} \end{cases}$ obtain the distribution of $Y = X + 5$.

b) State and prove multiplication theorem of expectation. 4

4. Attempt **any two** of the following : 10

a) A continuous random variable X has pdf given by $f(x) = \begin{cases} \frac{1}{\pi} & ; -\frac{\pi}{2} \leq x \leq \frac{\pi}{2} \\ 0 & ; \text{ow} \end{cases}$

find the distribution of $Y = \tan x$.

b) State the properties of bivariate cumulative distribution function of (X, Y) .

c) The joint p.d.f. of (X, Y) is given by

$f(x, y) = \begin{cases} kxy & ; 0 < x < 1, 0 < y < 1 \& k > 0 \\ 0 & ; \text{ow} \end{cases}$

find k , also obtain marginal p.d.f. of X .

5. Attempt **any two** of the following : 10

a) Let a random variable X has $U(0, \theta)$ distribution. Find the cdf of X and hence determine median of X .

b) Define exponential distribution with parameter θ . Find its m.g.f.

c) If X has uniform distribution over $(0, 1)$ with pdf

$f(x) = \begin{cases} 1 & ; 0 \leq x \leq 1 \\ 0 & ; \text{ow} \end{cases}$

find the distribution of $Y = -2 \log_e X$.



Seat No.	
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**B.Sc. – I (Semester – I) (CGPA Pattern) Examination, 2015
GEOLOGY (Paper – I)
Mineralogy, Palaeontology, Igneous, Sedimentary and Metamorphic
Petrology**

Day and Date : Tuesday, 21-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N.B. :** 1) *All questions are compulsory.*
2) *Figure to the right indicate full marks.*
3) *Answer to both Sections should be written in same answer book.*
4) *Draw neat diagrams wherever necessary.*

**SECTION – I
(Mineralogy and Palaeontology)**

1. Fill in the blank with correct answer from the given options. 5
- 1) Forsterite belongs to _____ mineral group.
a) Olivine b) Silica
c) Mica d) Garnet
 - 2) Colour of hypersthene is _____
a) green b) pink c) brown d) red
 - 3) Form of asbestos is _____
a) crystallized b) amorphous
c) fibrous d) dull
 - 4) Example of Lamellibranchia shell is _____
a) Cardium b) Nautilus
c) Conus d) Ogygia
 - 5) Colour of Tubipora is _____
a) red b) blue
c) green d) pink

P.T.O.



2. Answer **any five** of the following : 10
- 1) Define mineral.
 - 2) Define fossil.
 - 3) What is chemical sanding ? List out the types of bonding.
 - 4) Define cleavage of the mineral.
 - 5) Define streak of the mineral and give the examples.
 - 6) Symmetry characteristics of Lamellibranchia shells.
 - 7) What is imprint type of mode of preservation.
3. A) Write short notes on **any two** of the following : 10
- 1) Colour of mineral.
 - 2) Lustre of mineral.
 - 3) Entire animal preserved.
- B) Answer **any one** of the following : 10
- i) Describe pyroxene group of minerals.
 - ii) Describe conditions of fossilization and add note on track and trail mode of preservation.

SECTION – II
(Igneous, Sedimentary and Metamorphic Petrology)

1. Fill in the blanks with correct answer given in the options. 5
- 1) Rocks formed due to cooling of lava or magma are called as _____
 - a) Igneous
 - b) Metamorphic
 - c) Sedimentary
 - d) Clastic
 - 2) Granite gneiss is _____ rock.
 - a) Igneous
 - b) Metamorphic
 - c) Thermal
 - d) Clastic
 - 3) Uniform pressure environment forms _____ rocks of metamorphic class.
 - a) thermal
 - b) plutonic
 - c) slaty
 - d) cataclastic



4) Conglomerate shows _____ structure.

- a) Lamination
- b) Flow
- c) Slaty
- d) Clastic

5) Basalt is igneous _____ rock.

- a) Hypabyssal
- b) Plutonic
- c) Volcanic
- d) Clastic

2. Answer **any five** of the following : **10**

- i) Define metamorphic rock.
- ii) Define sedimentary rock.
- iii) Describe Breccia.
- iv) Describe Arkose.
- v) Describe Rhyolite.
- vi) Describe Basalt.
- vii) Describe slate.

3. A) Write short notes on **any two** of following : **10**

- i) Composition of magma.
- ii) Origin of magma and lava and rocks.
- iii) Agents of metamorphism.

B) Answer **any one** of the following : **10**

- i) Describe formation of sedimentary rocks.
 - ii) Describe concordant forms of igneous rocks.
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Seat No.	
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B.Sc. – II (Sem. – III) (Old) Examination, 2015
GEOCHEMISTRY (Paper – I)
Introduction to Geochemistry

Day and Date : Saturday, 23-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagram wherever necessary.**

- I. Choose the correct alternative for each of the following : **10**
- 1) When the radius ratio of cation : anion is between 0.41 and 0.73 the arrangement of anion around cation would be as at the corners of an octahedron, in which case the coordination number of cation shall be ?
a) 3 b) 4 c) 6 d) 8
 - 2) The type of bonds noticed in rock forming mineral is mostly
a) Ionic b) Vander Waals c) Covalent d) None
 - 3) What is the radius of K^+ ?
a) 1.70 \AA b) 1.49 \AA c) 1.38 \AA d) 1.36 \AA
 - 4) Gibbs phase rule is expressed as
a) $w = c + 2 - P$ b) $w = c - 2 + P$ c) $c = w + 2 + P$ d) None
 - 5) The maximum number of crystalline phases that can coexist in rocks in stable equilibrium is equal to the number of components was stated by
a) Goldschmidt b) Lawson c) Winkler d) None
 - 6) The energy absorbed by a mole of the crystal to disperse into infinitely separated ions is termed as
a) Born-Lande energy b) Lattice energy
c) Freedom energy d) None
 - 7) As a general rule the substitution of ions takes place when the charge difference is not more the unity and size difference is not more than
a) 5% b) 10% c) 15% d) 20%



- 8) Rb^+ (1.49 \AA°) substitute K^+ (1.38 \AA°) in potassium minerals under the Goldschmidt rule termed as
 a) Capture b) Camouflaged c) Admittance d) None
- 9) In tectosilicates Si : O ratio is 1 : 2 and the minerals having the tectosilicate structure are of
 a) Olivine b) Pyroxene c) Amphibole d) Feldspar
- 10) Marcasite and pyrite are polymorphs. Marcasite may invert to pyrite but pyrite never changes to marcasite. Such polymorphs are termed as
 a) Monotropic b) Enantiotropic c) Mengiotropic d) None

II. Answer **any five** of the following : **10**

- i) Application of Goldschmidt phase rule.
- ii) Mineral stability of NaCl.
- iii) Rules governing atomic substitution of minor elements.
- iv) 3 – D structure in RFM.
- v) Polymorphism in silicate minerals.
- vi) Covalent bonds.

III. A) Answer **any two** of the following : **6**

- i) Isomorphism ii) Radius ratio iii) Neso silicates

B) Write short notes on the following : **4**

Goldschmidt rules of atomic substitution.

IV. Answer **any two** of the following : **10**

- i) Electronegativity ii) Isomorphism iii) Chain silicates

V. Answer **any two** of the following : **10**

- i) General rules of the 3 – D structure with solid geometry.
- ii) Homo desmic and Hetero desmic bonds.
- iii) Coordination number of 'Al' in alumino silicates.



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B.Sc. – II (Sem. – III) (Old) Examination, 2015
ZOOLOGY (Paper – V)
Animal Diversity – III

Day and Date : Saturday, 23-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat and labelled diagrams wherever necessary.**
3) Figures to the **right indicate full marks.**

1. Select the appropriate answer from **each** of the following and complete the sentence :

10

- i) Cockroach belongs to class
a) Insecta b) Crustacea c) Myriapoda d) Arachnida
- ii) Internal shell is present in
a) Snail b) Chiten c) Pila d) Sepia
- iii) In a single row of radula of pila _____ number of teeth are present.
a) 4 b) 6 c) 7 d) 8
- iv) Number of thoracic ganglia in cockroach is
a) 2 b) 3 c) 4 d) 6
- v) Statocyst of Pila is concerned with
a) Defence b) Excretion c) Vision d) Equilibrium
- vi) Cockroach heart is _____ chambered.
a) 10 b) 15 c) 13 d) 12
- vii) Biting and chewing type of mouth parts are found in
a) Mosquito b) Butterfly c) Honey bee d) Cockroach
- viii) In Aplysia the foot is used for
a) Swimming b) Creeping c) Digging d) Boaring



ix) Malaria disease is caused by biting of _____ female mosquito.

- | | |
|-------------|--------------|
| a) Mansonia | b) Anopheles |
| c) Culex | d) Aedes |

x) Pedicellariae are present in

- | | |
|------------------|-----------------|
| a) Mollusca | b) Arthropoda |
| c) Echinodermata | d) Hemichordata |

2. Answer **any five** of the following : 10

- i) General characters of phylum mollusca.
- ii) Nerve ring in cockroach.
- iii) Heart of cockroach.
- iv) Functions of foot in Mollusca.
- v) Biological control of filaria.
- vi) Leg of cockroach.

3. A) Answer **any two** of the following : 6

- i) Radula of Pila.
- ii) Cornea of cockroach.
- iii) Foot in cephalopoda.

B) Give the salient features of phylum Echinodermata. 4

4. Answer **any two** of the following : 10

- i) Describe palial complex in Pila.
- ii) Describe mouth parts of butterfly.
- iii) Describe the structure and function of osphradium of Pila.

5. Answer **any one** of the following : 10

- i) Describe the digestive system of cockroach.
 - ii) Describe the nervous system of Pila.
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B.Sc. – II (Semester – III) (Old) Examination, 2015
STATISTICS (Paper – VI)
Discrete Probability Distributions and Statistical Methods

Day and Date : Monday, 25-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative : 101) If $X \sim P(1)$ and $Y \sim P(2)$ are independent then $P[X = K/X + Y = n]$ is _____ distribution.

- a) Poisson b) Binomial
c) Geometric d) Hypergeometric

2) If $X \sim \text{Geo}(0.6)$ the mean of waiting time distribution is

- a) $\frac{4}{10}$ b) $\frac{6}{10}$ c) $\frac{10}{6}$ d) None of these

3) A Poisson random variable has $\mu_4 = 2$, the value of its mean is

- a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{4}$ d) $\frac{3}{4}$

4) The distribution possessing the memoryless property is

- a) Poisson distribution b) Geometric distribution
c) Hypergeometric distribution d) All the above

5) The coefficient of variation of Poisson distribution with mean 4 is

- a) 50 b) 25 c) 400 d) 200

6) Let (X_1, X_2, X_3) be a random vector follows multinomial distribution with usual notations then $\text{CoV}(X_1, X_2) =$

- a) $P_1 P_2$ b) $-n P_1 P_2$ c) $2 P_1 P_2$ d) None of these



- 7) The range of partial correlation coefficient is
 a) 0 to ∞ b) 0 to +1 c) -1 to +1 d) $-\infty$ to ∞
- 8) A family of parametric distribution in which mean is equal to variance is
 a) Binomial distribution b) Geometric distribution
 c) Normal distribution d) Poisson distribution
- 9) A discrete random variable has probability mass function $P(x) = Kq^x p$; $p + q = 1$; $x = 2, 3, 4, \dots$. The value K should be equal to
 a) $\frac{1}{q^2}$ b) $\frac{1}{p}$ c) $\frac{1}{q}$ d) $\frac{1}{pq}$
- 10) If $X \sim NB(r, p)$ such that $E(X) = 12$, $V(X) = 36$ then
 a) $r = 3, p = \frac{1}{3}$ b) $r = 12, p = \frac{1}{4}$ c) $r = 36, p = \frac{1}{2}$ d) $r = 6, p = \frac{1}{3}$

2. Solve **any five** of the following :

10

- Find mean of Poisson distribution with parameter λ .
- Give the recurrence relation of probabilities of negative binomial distribution.
- Find pgf of geometric distribution.
- Define multiple regression.
- Show that for negative binomial distribution variance is greater or equal to mean.
- Prove that sum of two independent Poisson variates is a Poisson variate.

3. A) Solve **any two** out of three :

6

- With usual notations prove that $1 - R_{1,23}^2 = (1 - r_{12}^2)(1 - r_{13,2}^2)$.
- Obtain the probability generating function (pgf) of negative binomial distribution. Hence find its mean.
- Define the partial regression coefficients $b_{13,2}$ and $b_{12,3}$. Write the equation of regression plane of X_1 on X_2 and X_3 .

B) Prove that the necessary and sufficient condition for the three regression planes to coincide is

$$r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23} = 1.$$

4



4. Solve **any two** out of three : 10

- i) Obtain the expression for multiple correlation coefficient $R_{1.23}$ in terms of total correlation coefficients r_{12} , r_{13} and r_{23} .
- ii) If X and Y are independent Poisson variates, such that $P(X = 1) = P(X = 2)$ and $P(Y = 2) = P(Y = 3)$ then find (i) Mean of $(X + Y)$ and (ii) Variance of $(X - 2Y)$.
- iii) If X_1, X_2, X_3 satisfy the relation $a_1X_1 + a_2X_2 + a_3X_3 = K$.

Prove that
$$r_{12} = \frac{a_3^2\sigma_3^2 - a_1^2\sigma_1^2 - a_2^2\sigma_2^2}{2a_1a_2\sigma_1\sigma_2}.$$

5. Solve **any two** out of three. 10

- i) State and prove the lack of memory. Property of geometric distribution with parameter P.
 - ii) Prove that
$$b_{12} = \frac{b_{12.3} + b_{13.2} b_{32.1}}{1 - b_{13.2} b_{31.2}}.$$
 - iii) Derive the expression for the partial correlation coefficient $r_{12.3}$ in terms of total correlation coefficients.
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Seat
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B.Sc. – II (Semester – III) (Old) Examination, 2015
GEOCHEMISTRY (Paper – II)
Introduction to Solar System and Geospheres

Day and Date : Monday, 25-5-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** diagrams **wherever** necessary.

I. Choose the **correct** answer for **each** of the following : **10**

- 1) The distribution of elements in earth's interior is governed by
 - a) electronic configuration
 - b) gravity
 - c) nuclear mass
 - d) none
- 2) The elements Na, Ca, Mg etc. are found concentrated in sea water because of their
 - a) high $\frac{z}{r}$
 - b) low $\frac{z}{r}$
 - c) constant $\frac{z}{r}$
 - d) none
- 3) Identify the element that does not belong to lithophile
 - a) Na
 - b) K
 - c) Ca
 - d) Cu
- 4) The carbon dioxide content increases in the atmosphere due to consumption of
 - a) nuclear fuel
 - b) fossil fuel
 - c) radioactive energy
 - d) none
- 5) What percentage of volume of oxygen is present in the continental crust ?
 - a) 10
 - b) 20
 - c) 30
 - d) 100
- 6) The noteworthy addition to atmosphere during geological time is/are
 - a) O
 - b) He
 - c) Ar
 - d) all the above
- 7) According to Oddo-Harkins rule the elements of even atomic number are
 - a) abundant
 - b) less abundant
 - c) equal
 - d) none



- 8) The lithophiles form ions with their outermost electron shell having
a) 50 electrons b) 8 electrons c) 18 electrons d) none
- 9) The relative concentration of Na, Ca, Mg in sea water is
a) Mg > Na > Ca b) Na > Mg > Ca c) Ca > Na > Mg d) None
- 10) Find the odd one out
a) Cu b) Pb c) Zn d) Ar

II. Answer **any five** of the following : **10**

Define the terms :

- a) Meteorite
- b) Chalcophile
- c) Tropopause
- d) Salinity
- e) Green House gases
- f) Primeval atmosphere.

III. A) Answer **any two** of the following : **6**

- 1) Composition of sun
- 2) Composition of sea water and river water
- 3) Different layers of atmosphere.

B) Geochemical model of Earth as a whole. **4**

IV. Answer **any two** of the following : **10**

- 1) Gains and losses to atmosphere.
- 2) Gains and losses of elements to the oceans.
- 3) Cosmic abundance of elements.

V. Answer **any two** of the following : **10**

- 1) Primary differentiation of elements.
 - 2) Structure of atmospheric layers.
 - 3) Average composition of crust.
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B.Sc. – II (Semester – III) (Old) Examination, 2015

ZOOLOGY (Paper – VI)

Cell Science, Genetics Biological Chemistry and Economic Zoology

Day and Date : Monday, 25-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labelled diagrams wherever necessary.**
4) **Write the question number attempted in the margin.**

1. Select the appropriate answer from these given below each question and rewrite the sentences. **10**

i) _____ is a Ornamental fish.

- a) Labeo Rohita b) Mrigal c) Catla-catla d) Gold fish

ii) _____ is a breed of goat.

- a) Deoni b) Rath c) Ongole d) Bar-bari

iii) _____ is a Desibreed in Poultry.

- a) Leghorn b) Aseel c) Red cap d) Polymouth Rock

iv) Cellulose is _____

- a) Polysaccharide b) Disaccharide
c) Oligosaccharide d) Monosaccharide

v) Crossing over occurs between _____

- a) Sister chromatids b) Non-homologous chromosomes
c) Non sister chromatids d) None

vi) Complete linkage in Drosophila was observed by

- a) Boveri b) T.H. Morgan
c) Sutton d) Batson and Punnett

P.T.O.



vii) In Meiosis, Pairing of homologous chromosomes take place during _____ sub stage.

- a) Leptotene b) Pachytene c) Zygotene d) Diplotene

viii) The pH below 7 is

- a) Acidic b) Basic c) Neutral d) All the above

ix) m-R.N.A. is a complimentary copy of

- a) Ribosomal D.N.A. b) Single standed D.N.A.
c) t-R.N.A. d) Ribosomal R.N.A.

x) Stifling is related with

- a) Sericulture b) Apiculture c) Lac Culture d) Fish Culture

2. Answer **any five** of the following : **10**

- i) Significance of Pachytene ii) Honey comb
iii) Food value - Egg iv) Types of silk moth
v) D.N.A. vi) Ranikhet

3. A) Answer **any two** of the following : **6**

- i) Supplementary genes
ii) Economic importance of Apiculture
iii) Crossing over– Mechanism.

B) Economic importance of sericulture. **4**

4. Answer **any two** of the following : **10**

- i) Describe the structure of R.N.A. and add a note on its biological significance.
ii) Explain the construction and maintenance of ornamental fishes.
iii) Give an account on rearing of silk worm.

5. Answer **any one** of the following : **10**

- i) Explain the milk and milk products of Dairy.
ii) Give an account on management of poultry.
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B.Sc. – II (Semester – III) (Old) Examination, 2015
MATHEMATICS (Paper – V)
Differential Calculus – II

Day and Date : Tuesday, 26-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative for **each** of the following : **10**1) The radius of curvature for the curve $y = e^x$ at the point (0, 1) is

- a)
- $2\sqrt{2}$
- b)
- $3\sqrt{2}$
- c) 0 d) 1

2) For the curve $s = ae^{x/a}$

a) $\rho = \frac{s}{\sqrt{s^2 - a^2}}$ b) $a\rho = s(s^2 - a^2)^{1/2}$

c) $\rho = (s^2 - a^2)^{1/2}$ d) $\rho = \rho(s^2 - a^2)^{1/2}$

3) The curvature of a straight line at every point is

- a) 1 b) 0 c)
- ∞
- d)
- $-\infty$

4) The Cartesian form of radius of curvature $y = f(x)$ is

a) $\frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{d^2y/dx^2}$

b) $\frac{\left[1 + \left(\frac{dx}{dy}\right)^2\right]^{3/2}}{d^2x/dy^2}$

c) $\frac{\left[1 + \left(\frac{d^2y}{dx^2}\right)^2\right]^{3/2}}{dy/dx}$

d) $\frac{\left[1 + \frac{dy}{dx}\right]^{3/2}}{d^2y/dx^2}$



- 5) If $x = r \cos \theta$, $y = r \sin \theta$ then $\frac{\partial(r, \theta)}{\partial(x, y)}$ is
- a) r b) x c) y d) $\frac{1}{r}$
- 6) If $x = u(1 + v)$ $y = v(1 + u)$ then $\frac{\partial(x, y)}{\partial(u, v)} =$
- a) $u + v$ b) $1 + u + v$ c) $1 - u + v$ d) $1 - u - v$
- 7) A function $f(x, y)$ is maximum at point (a, b) if
- a) $AC - B^2 > 0$ and $A > 0$ b) $AC - B^2 > 0$ and $A < 0$
 c) $AC - B^2 < 0$ and $A > 0$ d) $AC - B^2 < 0$ and $A < 0$
- 8) The greatest and least value of the function $f(x) = 3x^4 - 2x^3 - 6x^2 + 6x + 1$ in $[0, 2]$ is
- a) 1, 21 b) 2, 11 c) 0, 21 d) 1, 2
- 9) The maximum value of $\sin x + \cos x$ is
- a) 2 b) $\sqrt{2}$ c) 1 d) 0
- 10) If $u = f_1(x_1)$ $u_2 = f_2(x_1, x_2) \dots u_n = f_n(x_1, x_2, \dots, x_n)$ then $\frac{\partial(u_1, u_2, \dots, u_n)}{\partial(x_1, x_2, \dots, x_n)}$ is
- a) $\frac{\partial u_1}{\partial x_1}$ b) $\frac{\partial u_1}{\partial x_1} \cdot \frac{\partial u_n}{\partial x_n}$
 c) $\frac{\partial u_1}{\partial x_1} \cdot \frac{\partial u_2}{\partial x_2} \cdot \frac{\partial u_3}{\partial x_3} \dots \frac{\partial u_n}{\partial x_n}$ d) None of the above

2. Attempt **any five** of the following :

10

1) Show that $\frac{r}{\rho} = \sin \phi \left(1 + \frac{d\phi}{d\theta} \right)$.

2) Find the radius of curvature at any pt. $S = 4a \sin \frac{\psi}{3}$.

3) Examine the polynomial function given by $10x^6 - 24x^5 + 15x^4 - 40x^3 + 108$ for maximum and minimum values.

4) If $x = uv$ $y = \frac{u}{v}$ $J = \frac{\partial(x, y)}{\partial(u, v)}$ $J' = \frac{\partial(u, v)}{\partial(x, y)}$ prove that $JJ' = 1$.

5) Find the Jacobian of the transformation $u = x(y + z)$ $v = y(x + z)$ $w = z(x - y)$.

6) State the sufficient condition for extreme values of functions of two variable.



3. A) Attempt **any two** of the following : 6

1) Prove that for any curve $\sin^2 \phi \frac{d\phi}{d\theta} + r \frac{d^2r}{ds^2} = 0$.

2) If $x = r \sin \theta \cos \phi$, $y = r \sin \theta \sin \phi$, $z = r \cos \theta$ show that

$$\frac{\partial(x, y, z)}{\partial(r, \theta, \phi)} = r^2 \sin \theta.$$

3) Find the extreme value of the function $f(x, y) = x^3 + y^3 - 3axy$ $a > 0$.

B) Show that for the curve $s^2 = 8ay$ $\rho = 4a \sqrt{1 - \frac{y}{2a}}$. 4

4. Attempt **any two** of the following : 10

1) With usual notation prove that $\rho = \frac{a^2b^2}{p^3}$ for the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

2) Show that the minimum value of $u = xy + \frac{a^3}{x} + \frac{a^3}{y}$ is $3a^2$.

3) If $u^3 + v^3 + w^3 = x + y + z$, $u^2 + v^2 + w^2 = x^3 + y^3 + z^3$, $u + v + w = x^2 + y^2 + z^2$ then

show that
$$\frac{\partial(u, v, w)}{\partial(x, y, z)} = \frac{(y - z)(z - x)(x - y)}{(u - v)(v - w)(w - u)}.$$

5. Attempt **any two** of the following : 10

1) If $x + y + z = u$, $y + z = uv$, $z = uvw$ Find $\frac{\partial(x, y, z)}{\partial(u, v, w)}$.

2) Show that the height of an open cylinder of a given surface and greatest volume is equal to radius of its base.

3) Show that radius of curvature for the curve $r^m = a^m \cos m\theta$ is $\rho = \frac{a^m}{(m + 1)r^{m-1}}$.



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B.Sc. – II (Semester – III) Examination, 2015
BOTANY (Paper – V) (Old)
Development of Plants

Day and Date : Tuesday, 26-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by choosing correct alternative : **10**
- 1) Conjoint, collateral and open vascular bundles are found in
a) Dicot stem b) Dicot leaf c) Monocot stem d) Monocot root
 - 2) The term Epiblema is used for
a) Epidermis of stem b) Epidermis of root
c) Epidermis of leaf d) Epidermis of fruit
 - 3) According to position there are _____ types of meristems.
a) 3 b) 4 c) 5 d) 6
 - 4) Sunken stomata are present in
a) Hydrophytes b) Epiphytes c) Mesophytes d) Xerophytes
 - 5) Dead and lignified cells forms _____ tissue.
a) Parenchyma b) Sclerenchyma c) Collenchyma d) Aerenchyma
 - 6) Xylem and phloem together form
a) Simple tissues b) Complex tissue
c) Conducting tissues d) Storage tissues
 - 7) Cambium between xylem and phloem is called
a) Fascicular cambium b) Interfascicular cambium
c) Cork cambium d) Peripheral cambium
 - 8) Lenticel is substitute for
a) Epidermis b) Stomata c) Hypodermis d) Endodermis



- 9) Annual ring is formed by _____ and _____
a) Heartwood, sapwood b) Autumn, Springwood
c) Poruswood, Non-poruswood d) None, None of these
- 10) The abnormal secondary growth in Dracaena is
a) Adaptive b) Non-adaptive c) Acquired d) None of these

2. Answer **any five** of the following : **10**

- i) Write the functions of Aerial organs of the plant.
- ii) Give structure and functions of xylem tissue.
- iii) What is cork cambium ?
- iv) What is Tylosis ?
- v) Define secondary growth.
- vi) Give functions of mechanical tissue.

3. A) Answer **any two** of the following : **6**

- i) Explain Tunica-carpus theory.
- ii) Describe the primary structure of monocot root.
- iii) Write on heartwood and sapwood.

B) Describe the components of xylem with their functions. **4**

4. Answer **any two** of the following : **10**

- i) Give the functions of any three secretory tissues.
- ii) Describe the internal structures of dicot leaf.
- iii) Write on porus and non-poruswood.

5. Answer **any two** of the following : **10**

- i) Give structure and functions of lenticel.
 - ii) Describe structure and functions of epidermal tissue system.
 - iii) Describe the abnormal secondary growth in Bignonia.
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B.Sc. II (Semester – III) (Old) Examination, 2015
MATHEMATICS (Paper – VI)
Differential Equations – II

Day and Date : Wednesday, 27-5-2015

Max.Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose correct alternative for each of the following : **10**
- 1) The solution of the differential equation $y = px + f(p)$ is
 - a) $y = cx - f(c)$
 - b) $y = cx + f(c)$
 - c) $y = f(c) - cx$
 - d) None of these

 - 2) The differential equation of the form $y^2 = pxy + f\left(\frac{py}{x}\right)$ reduces to Clairaut's form by the substitution
 - a) $x^2 = u, y^2 = v$
 - b) $x = u, y = v$
 - c) $x^2 = v, y^2 = u$
 - d) $x = u^2, y = v^2$

 - 3) The homogeneous linear differential equation transforms to linear differential equation with constant coefficients by using the substitution
 - a) $z = e^x$
 - b) $z = e^{-x}$
 - c) $x = \log z$
 - d) $x = e^z$

 - 4) If $\frac{d^2y}{dx^2} - 2\tan x \frac{dy}{dx} + 3y = 2 \sec x$ then the part of the C.F.=
 - a) $y = \cos x$
 - b) $y = e^x$
 - c) $y = \sin x$
 - d) $y = x^m$

 - 5) Solution of the differential equation $p = \log(px - y)$ is
 - a) $y = cx - \log c$
 - b) $y = \log(cx + d)$
 - c) $c = \log(cx)$
 - d) $y = cx - e^c$



- 6) If we put $z = \log x$ then $x^2 \frac{d^2y}{dx^2} = \underline{\hspace{2cm}}$ where $D = \frac{d}{dz}$.
- a) Dy b) $D(D - 1)z$ c) $D(D - 1)y$ d) $D(D + 1)y$
- 7) $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ be a linear second order differential equation with $1 - P + Q = 0$ then the part of C.F. =
- a) $y = e^x$ b) $y = e^{-x}$ c) $y = x$ d) $y = x^m$
- 8) The solutions of the differential equations $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$ are
- a) $x = y, y = zx$ b) $x = c_1y, y = c_2z$
 c) $x + y = c_1, x - y = c_2$ d) none of these
- 9) The differential equation of the type $Pdx + Qdy + Rdz = 0$, where P, Q, R are the functions of x, y, z is called
- a) Total differential equation b) Linear differential equation
 c) Exact differential equation d) Simultaneous differential equation
- 10) The solution of the differential equation $2yzdx - 3zxdy - 4xydz = 0$ is
- a) $x^2 + y^2 + z^2 = a^2$ b) $2x - 3y - 4z = k$
 c) $x^2 = k y^3 z^4$ d) None of these

2. Attempt **any five** from the following :

10

- 1) Solve $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$.
- 2) Solve the total differential equation $(y + z)dx + (z + x)dy + (x + y)dz = 0$.
- 3) Solve $p(p - y) = x(x + y)$.
- 4) Solve $(xp - y)^2 = p^2 - 1$.
- 5) Solve the homogeneous linear differential equation $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - 4y = 0$.
- 6) Find the part of complementary solution for the differential equation $x \frac{d^2y}{dx^2} - 2(x + 1) \frac{dy}{dx} + (x + 2)y = (x - 2)e^{2x}$.



3. A) Attempt **any two** from the following : 6

1) Solve $\frac{d^2y}{dx^2} - 2\tan x \frac{dy}{dx} + 3y = 2\sec x$.

2) Explain any one of the method of solving $Pdx + Qdy + Rdz = 0$, where P, Q, R are functions of x, y, z.

3) Solve the differential equation $x^2 \frac{d^2y}{dx^2} - 2(x^2 + x) \frac{dy}{dx} + (x^2 + 2x + 2)y = 0$ by removal of the first order derivatives.

B) Define Clairaut's differential equation and explain how it can be solved. 4

4. Attempt **any two** from the following : 10

1) Define homogeneous linear differential equation and explain how it can be solved.

2) Explain the method of solving second order linear differential equation of the

type $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ by changing independent variable.

3) Solve the simultaneous differential equation $\frac{dx}{xz} = \frac{dy}{yz} = \frac{dz}{(x+y)^2}$.

5. Attempt **any two** from the following : 10

1) State and prove the necessary condition for the integrability of the differential equation $Pdx + Qdy + Rdz = 0$.

2) Solve the differential equation $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x + 2) \frac{dy}{dx} - 36y = x^2 + x + 1$.

3) Explain the method of solving the equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ where P, Q, R are functions of x by removal of first order derivative by changing the dependent variable.



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B.Sc. I (Semester – I) (C.G.P.A. Pattern) Examination, 2015
MICROBIOLOGY (Paper – I)
Fundamentals of Microbiology and Microbial Techniques

Day and Date : Tuesday, 21-4-2015

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Answers to the two Sections should be written in the separate answer books.**

SECTION – I

(Fundamentals of Microbiology)

1. Rewrite the following sentences by selecting correct answers from given alternatives.

5

- 1) The protein component of bacterial locomotory organelle is
a) Albumin b) Pillin c) Flagellin d) Globulin
- 2) Procaryotic bacteria contain _____ type of ribosome.
a) 80s b) 70s c) 20s d) 16s
- 3) Actinomycetes is a link between bacteria and
a) algae b) viruses c) fungi d) mycoplasma
- 4) Alexander Flemming discovered _____ antibiotic.
a) Penicillin b) Streptomycin c) Neomycin d) Tetracyclin
- 5) The binomial nomenclature system was given by
a) Koch b) Linnaeus c) Ivanowasky d) Pasteur

P.T.O.



2. Answer **any five** of the following. 10
- i) Give functions of flagella.
 - ii) Give contributions of Robert Koch.
 - iii) What is Taxonomy ?
 - iv) Characteristics of Rickettsia.
 - v) Flagellar arrangement.
 - vi) Pili.
 - vii) Morphological types of bacteria.
3. A) Write short notes on **any two** of the following. 10
- i) Structure and functions of cell membrane.
 - ii) Criteria for bacterial classification.
 - iii) General characters of actinomycetes.
- B) Answer **any one** of the following. 10
- i) Draw a well labelled diagram of typical procaryotic cell and differentiate between procaryotic and eukaryotic cells.
 - ii) Give an account of structure and functions of cell wall.

SECTION – II

(Microbial Techniques)

1. Rewrite the following sentences by selecting correct answers from given alternatives. 5
- 1) In Gram's staining procedure _____ works as primary stain.
- a) Saffranin
 - b) 95% alcohol
 - c) Gram's iodine
 - d) Crystal violet
- 2) Hot air oven makes use of _____ for sterilization.
- a) Moist heat
 - b) Dry heat
 - c) Radiation
 - d) Filtration



- 3) The efficiency of microscope depends on
- a) Resolving power
 - b) Size
 - c) Cost
 - d) Numerical aperture
- 4) Nutrient agar is an example of _____ medium.
- a) Natural
 - b) Living
 - c) Synthetic
 - d) Semisynthetic
- 5) Colouring property of a dye is due to _____ group.
- a) Aurochrome
 - b) Chromophore
 - c) Chromosome
 - d) Cytochrome

2. Answer **any five** of the following. **10**

- i) Define sterilization.
- ii) Define stain.
- iii) Resolving power of compound microscope.
- iv) Selective media.
- v) Negative staining.
- vi) Use of phenols and its derivatives.
- vii) Types of stains with example.

3. A) Write short notes on **any two** of the following. **10**

- i) Serial dilution technique.
- ii) Sterilization by the use of moist heat.
- iii) Magnification of compound microscope.

B) Answer **any one** of the following. **10**

- i) Write in detail about non living media.
 - ii) What is differential staining ? Write in detail about 'Gram staining'.
-



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Seat No.	
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B.Sc. – II (Semester – III) (Old Course) Examination, 2015
BOTANY (Paper – VI)
Plant Ecology

Day and Date : Wednesday, 27-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** i) Figures to the **right** indicate **full** marks.
ii) Draw **neat** labelled diagrams **wherever** necessary.
iii) **All** questions are **compulsory**.

1. Rewrite the sentence by choosing proper answer : **10**
- i) The base of ecological pyramid of energy is always occupied by
- Primary consumers
 - Secondary consumers
 - Producers
 - Decomposers
- ii) _____ show poorly developed root system.
- Mesophytes
 - Hydrophytes
 - Xerophytes
 - Ephemerals
- iii) _____ population shows individuals of only one species.
- Mixed
 - Monospecific
 - Polyspecific
 - None of these
- iv) The plant species widely distributed over the earth in definite climatic zone and different continents are referred to as
- Wides
 - Endemics
 - Discontinuous species
 - None of these

P.T.O.



- v) Anthoxanthium sp. indicates presence of _____ in the soil.
- a) Iron
 - b) Zinc
 - c) Boron
 - d) Magnesium
- vi) _____ are called shade loving plants.
- a) Heliophytes
 - b) Sciophytes
 - c) Cryptophytes
 - d) Xerophytes
- vii) _____ is the qualitative character of the community.
- a) Floristic composition
 - b) Frequency
 - c) Abundance
 - d) Density
- viii) _____ is the biotic component of ecosystem.
- a) Sunlight
 - b) Water
 - c) Wind
 - d) Producers
- ix) Aggregation of different types of plant populations at a habitat is called
- a) Plant community
 - b) Animal community
 - c) Biotic community
 - d) All of these
- x) The plant succession which starts on rock is called
- a) Hydrosere
 - b) Lithosere
 - c) Psammosere
 - d) Halosere

2. Answer **any five** of the following :

10

- i) Define mortality and matality.
- ii) What is biogeochemical cycle ? Mention any two gaseous cycles.
- iii) What are eury and steno species ?
- iv) What is food chain ? Give an outline of detritus food chain.
- v) What is adaptation ? State any two anatomical adaptations of xerophytes.
- vi) What is phytogeography ? Enlist various factors affecting the geographical distribution of species.



3. A) Answer **any two** of the following : **6**
- i) What is population ? How does population dispersal occur in nature ?
 - ii) What are plant indicators ? Discuss in brief about role of plants as indicators of pollution.
 - iii) Write classification of soil particles based on their diameter.
- B) What is ecosystem ? What are the various components of forest ecosystem ? **4**
4. Answer **any two** of the following : **10**
- i) What is physiognomy ? Comment upon the Raunkaier's life form classes.
 - ii) What are ecological pyramids ? Write an account of pyramid of biomass in pond ecosystem.
 - iii) Define succession. Explain various stages of succession in xerosere.
5. Answer **any two** of the following : **10**
- i) Describe in brief phytogeographical regions of India.
 - ii) Discuss water cycle in brief.
 - iii) Explain the role of predators in regulating population size.
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B.Sc. (Part – II) (Semester – III) (Old) Examination, 2015
ELECTRONICS (Paper – V)
Electronics Circuits

Day and Date : Thursday, 28-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

- Instructions:** 1) **All questions are compulsory.**
2) **Draw the figures wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of calculator is allowed.**

1. Select the correct alternative from the following : **10**
- i) The emitter is at ac ground in _____ amplifier.
a) CC b) CE c) CB d) None
 - ii) The best frequency response is of _____ coupling.
a) RC b) Transformer c) Direct d) None
 - iii) The input impedance of _____ amplifier is highest.
a) CB b) CE c) CC d) None
 - iv) If the two stages of multistage amplifier have gains 30 dB and 10 dB, then overall gain is
a) 30 b) 20 c) 40 d) 300
 - v) _____ power amplifier has highest collector efficiency.
a) Class A b) Class B c) Class C d) Class AB
 - vi) Distortion of an amplifier _____ with negative feedback.
a) Decreases b) Increases
c) Does not change d) None
 - vii) CE amplifier with emitter resistor is an example of _____ feedback.
a) Voltage series b) Voltage shunt
c) Current series d) Current shunt
 - viii) Wienbridge oscillator is suitable for _____ frequency oscillations.
a) Low b) High c) RF d) IF



- ix) Capacitor is tapped in _____ oscillator.
a) Hartley b) Colpitt's c) Phase shift d) Wienbridge
- x) To improve CMRR in differential amplifier _____ is used.
a) Constant current source b) Small RE
c) Large RC d) None

2. Attempt **any five** of the following : **10**

- i) Draw the circuit diagram of transistor amplifier.
- ii) Why does RC coupling give constant gain over a mid frequency range ?
- iii) Give the classification of power amplifiers.
- iv) Give the essential conditions for an oscillator.
- v) Why negative feedback is applied in high gain amplifiers ?
- vi) What is the need of differential amplifiers ?

3. A) Attempt **any two** of the following : **6**

- i) Draw the circuit diagram of Class B push pull amplifier. Give its efficiency.
- ii) In Hartley oscillator $f = 500 \text{ KHz}$ and $C = 0.001 \mu\text{F}$. Calculate the value of inductor.
- iii) Explain constant current source used in differential amplifier.

B) An amplifier has a gain of 10,000 without feedback, with negative feedback gain is reduced to 50. Find feedback fraction. **4**

4. Attempt **any two** of the following : **10**

- i) Explain phase shift oscillator. Give the formula for frequency of oscillation.
- ii) Explain transformer coupled amplifier. Give its advantages.
- iii) Derive the expression for gain of emitter coupled differential amplifier.

5. Attempt **any two** of the following : **10**

- i) What is feedback ? Derive the expression for gain of the amplifier with feedback.
 - ii) Explain RC coupled Class A power amplifier.
 - iii) Derive the expression for current and voltage gain of emitter follower.
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B.Sc. II (Semester – III) (Old) Examination, 2015
GEOLOGY (Paper – V)
Optics and Minerology

Day and Date : Thursday, 28-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

1. Fill in the blanks with correct answer from the given options : 10
- 1) _____ is a mineral of mica group.
a) Nephelene b) Augite c) Phlogopite d) Argonite
 - 2) _____ minerals remain dark under crossed polars whatever the orientation of the section.
a) Isotropic b) Anisotropic c) Both a and b d) None of these
 - 3) The hardness of quartz is _____
a) 5 b) 6 c) 7 d) 8
 - 4) _____ mineral is belonging to the feldspar group.
a) Plagioclase b) Orthoclase
c) Both a) and b) d) None of these
 - 5) Inosilicates is also called as _____
a) chain silicate b) sheet silicates
c) ortho silicates d) ring silicates
 - 6) The composition of orthoclase is _____
a) $\text{Ca} [\text{Al}_2\text{Si}_4\text{O}_{12}]$ b) KAlSi_3O_8
c) $\text{Na}_3 (\text{Na}, \text{K}) [\text{Al}_4\text{Si}_4\text{O}_{16}]$ d) $\text{Al}_3 (\text{PO}_4)_2 (\text{OH})_3 \cdot 5\text{H}_2\text{O}$



- 7) The _____ are a group of hydroxylated chain silicate.
a) Silica b) Amphiboles c) Feldspar d) Pyroxene
- 8) The actinolite is found in _____ rocks.
a) Igneous b) Sedimentary c) Metamorphic d) All of these
- 9) The atomic structure of the mica consist of a _____ cations.
a) chain b) line c) sheet d) all of these
- 10) The relief of Olivine mineral is _____
a) Medium b) Low c) Low to medium d) High to very high

2. Answer **any five** of the following : **10**
- 1) Optical properties of Orthoclase
 - 2) Biaxial minerals
 - 3) Pleochrosim
 - 4) Colour
 - 5) Hardness
 - 6) Streak
3. A) Answer **any two** of the following : **6**
- 1) Mode of occurrences of mica group of minerals.
 - 2) Explain the fracture of minerals.
 - 3) Isomorphism.
- B) Explain uniaxial and biaxial minerals with suitable diagram. **4**
4. Answer **any two** of the following : **10**
- 1) Atomic structure and chemistry of Pyroxene group of minerals.
 - 2) Physical and optical properties of olivine.
 - 3) Explain reflection and retraction of minerals.
5. Answer **any two** of the following : **10**
- 1) Describe any two silicate structure.
 - 2) Describe the varieties of quartz and their occurrence.
 - 3) Define and describe polymorphism.
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B.Sc. II (Semester – III) (Old) Examination, 2015
MICROBIOLOGY (Paper – V)
Bacterial Cytology, Virology and Metabolism

Day and Date : Thursday, 28-5-2015

Max.Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by selecting to correct answers from the given alternatives :

10

- i) _____ is an example of thermophilic organism.
a) Bacillus psychrophilus b) E. Coli
c) Thermus aquaticus d) Klebsiella spp
- ii) _____ is an example of spore forming organism.
a) E. Coli b) Staphylococcus aureus
c) Bacillus d) Salmonella typhi
- iii) _____ enzymes are responsible for joining reactions.
a) Ligases b) Transferases
c) Oxidoreductases d) Lyases
- iv) _____ is absent in the cell wall of gram negative bacteria.
a) Peptidoglycan b) Teichoic acid
c) Lipoprotein d) Phospholipid
- v) Oligodynamic effect is exerted by _____
a) Temperature b) Heavy metals
c) Salts d) pH
- vi) Shape of TMV is _____
a) Rod b) Spherical
c) Helical d) Complex



- vii) In _____ growth, cells are growing in the same growth phase.
a) Continuous b) Diauxic c) Induced d) Synchronous
- viii) _____ granules are predominant in lactobacillus.
a) Sulfur b) Lipid c) Volutin d) PHB
- ix) The most effective bactericidal wavelength is of U.V. light is _____
a) 2550 A° b) 2750 A° c) 2650 A° d) 1550 A°
- x) In _____ flagellar arrangement, flagella are present all over the surface.
a) Lophotrichous b) Monotrichous
c) Amphitrichous d) Peritrichous

2. Answer **any five** of the following : 10
- i) Functions of flagella.
 - ii) Define oligodynamic effect.
 - iii) Explain thermophiles.
 - iv) Functions of cell membrane.
 - v) Define chemotaxis.
 - vi) List types of microorganisms on the basis of pH.
3. A) Answer **any two** of the following : 6
- i) Volutin granules
 - ii) Structure of HIV
 - iii) Passive transport
- B) Structure of cell wall of gram positive bacteria. 4
4. Answer **any two** of the following : 10
- i) Diauxic growth.
 - ii) Structure of bacterial endospore.
 - iii) Effect of temperature on growth of microorganisms.
5. Write short notes on (**any two**) : 10
- i) Methods of measurement of growth.
 - ii) Cultivation of viruses.
 - iii) Substrate level phosphorylation.
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B.Sc. – II (Sem. – III) (Old) Examination, 2015
ELECTRONICS (Paper – VI)
Pulse and Switching Circuits

Day and Date : Friday, 29-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Draw the figures wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of calculator is allowed.**

1. Select correct alternative from the following :

10

1) The circuit make use of components for waveshaping purpose is called linear waveshaping circuit.

- a) diode, capacitor, resistor b) diode, transistor, capacitor
c) resistor, capacitor, inductor d) transistor, inductor, capacitor

2) In UJT relaxation oscillator, the UJT is mainly used

- a) to charge the timing capacitor
b) to discharge the timing capacitor
c) to charge and discharge the timing capacitor
d) as a constant source

3) The o/p of differentiator in RC circuit is

- a) $V_o = \frac{1}{RC} \frac{dvi}{dt}$ b) $V_o = RC \times \frac{dvi}{dt}$ c) $V_o = \frac{R}{C} \frac{dvi}{dt}$ d) $V_o = \frac{C}{R} \frac{dvi}{dt}$

4) If a bistable multivibrator is triggered at 2 KHz input signal frequency. The o/p frequency will be

- a) 500 Hz b) 1 KHz c) 2 KHz d) 4 KHz

5) The hysteresis voltage in Schmitt Trigger circuit is

- a) $\frac{U.T.P.}{L.T.P.}$ b) $\frac{L.T.P.}{U.T.P.}$ c) $U.T.P. \times L.T.P.$ d) None of these

P.T.O.



- 6) In astable multivibrator using IC 555, 50% duty cycle is possible when
- a) $R_A = R_B$ b) $R_A \neq R_B$
 c) $R_A < R_B$ d) None of these
- 7) Pulse width of monostable multivibrator using IC-555 is
- a) $0.69 RC$ b) $1.1 RC$ c) $\frac{1}{0.693 RC}$ d) $\frac{1}{1.1 RC}$
- 8) Sweep speed of capacitor
- a) $I \times C$ b) $\frac{I}{C}$ c) $\frac{C}{I}$ d) None of these
- 9) A linear sweep is obtained in Miller integrator because
- a) Constant current source b) Small RC time constant
 c) Large RC time constant d) None of these
- 10) In a monostable multivibrator using B.J.T. the timing components are $10 \text{ K } \Omega$ and $0.1 \text{ } \mu\text{F}$. Then gate width will be
- a) 0.69 sec b) 6.9 m sec c) 69 m sec d) 0.69 m sec.

2. Attempt **any five** :

10

- 1) Draw a circuit diagram of diode as – ve clipper.
- 2) State any 2 general feature of time-base signals.
- 3) In symmetrical astable multivibrator
 $R_1 = R_2 = 10 \text{ k}\Omega$, $C_1 = C_2 = 0.01 \text{ } \mu\text{F}$ and $R_{L_1} = R_{L_2} = 1 \text{ k}\Omega$
 Find frequency of astable multivibrator.
- 4) Draw labelled pin diagram of IC – 555.
- 5) Draw input and output waveform of bistable multivibrator and comment it.
- 6) Give the role of comparators in the functional block diagram of IC 555.



3. A) Attempt **any two** of the following : **6**
- 1) Draw the circuit of RC integrator and show its response to square wave input.
 - 2) Explain U.J.T as a relaxation oscillator.
 - 3) Explain working of astable multivibrator using IC-555.
- B) Explain voltage control oscillator using IC-555. **4**
4. Attempt **any two** of the following : **10**
- 1) Draw the circuit diagram of collector coupled monostable multivibrator. Obtain the expression for gate width.
 - 2) Draw the functional block diagram of IC-555. and explain in brief.
 - 3) Explain Miller integrator with circuit diagram.
5. Attempt **any two** of the following : **10**
- 1) Explain transistor as a switch.
 - 2) Explain operation of Schmitt trigger and draw waveform.
 - 3) Explain with neat circuit diagram, the working negative biased clipper. Draw I/P and O/P waveforms.
-



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B.Sc. – II (Sem. – III) (Old) Examination, 2015
GEOLOGY (Paper – VI)
Structural Geology

Day and Date : Friday, 29-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Draw neat diagrams wherever necessary.**
3) **Figures to the right indicate full marks.**

1. Fill in the blanks with correct answer from the given below : **10**

- 1) Conjugate fold is also called
a) Fan fold b) Box fold c) Cuspate fold d) Chevron fold
- 2) _____ joints are parallel to the bedding of the associated sedimentary rock.
a) Bedding b) Diagonal c) Strike d) None of these
- 3) The block above the fault is called as
a) Hanging wall b) Foot wall c) Fault outcrop d) None of these
- 4) The _____ of a fold is the line of maximum curvature in a folded bed.
a) Dip b) Strike c) Hinge d) Slip
- 5) The most common mineral lineation is _____ mineral.
a) Orthoclase b) Calcite c) Augite d) Hornblende
- 6) The contact between older plutonic igneous rock and younger volcanic igneous rock is
a) angular unconformity b) non conformity
c) local unconformity d) disconformity
- 7) Rocks in the core of anticline fold are
a) Younger b) Older
c) Massive d) Younger and Older
- 8) Omission of bed is a criteria of _____ recognition.
a) Fault b) Joint c) Unconformity d) Fold

P.T.O.



9) A body said to be under _____ when it is subjected to external force that tend to pull it apart.

- a) Tension b) Compression c) Couple d) None of these

10) _____ in which both limbs are over turned.

- a) Box fold b) Chevron fold c) Fan Fold d) None of these

2. Answer **any five** of the following : **10**

- 1) Mineral lineation.
- 2) Strike of the bed.
- 3) Inlier.
- 4) Fault breccia.
- 5) Fracture cleavage.
- 6) Inverted limb.

3. A) Answer **any two** of the following : **6**

- 1) Colluminar joints.
- 2) Isoclinal fold
- 3) Strike slip fault.

B) Describe disconformity and non conformity. **4**

4. Answer **any two** of the following : **10**

- 1) Explain the parts of fold.
- 2) Bedding plane and its attitude.
- 3) What is foliation ? Describe two types of foliation.

5. Answer **any two** of the following : **10**

- 1) Explain the concept of deformation.
 - 2) Describe the physiographic criteria for recognition of fault.
 - 3) Explain genetic classification of joints.
-



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B.Sc. – I (Semester – I) (Old) Examination, 2015
ENGLISH (Compulsory)
On Track : English Skills for Success

Day and Date : Wednesday, 1-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

N.B : 1) *All questions are **compulsory**.*
2) *Figures to the **right** indicate **full** marks.*

1. Rewrite the following sentences by choosing **correct** alternative. **10**
- i) The name of the policeman on the beat was _____
a) Bob b) Jimmy c) Henry d) Joe
 - ii) From what she tells the writer, it is clear that Miss Krishna's life with her mother was _____
a) miserable b) comfortable c) very happy d) difficult
 - iii) The word 'intelligence' is derived from the _____ word intelligence.
a) Roman b) French c) Italian d) Latin
 - iv) The bangle sellers carrying their wares _____
a) to a married woman's house
b) to the streets
c) to the house of a maiden woman
d) to a temple fair
 - v) The speaker of the poem, 'An Irish Airman Foresees His Death' is an _____ soldier.
a) American b) English c) Irish d) Indian
 - vi) When the writer invited her to stay with her for a while, Miss Krishna agreed
a) reluctantly b) shyly c) readily d) sadly
 - vii) There is a mob on the road. The underlined word is _____ noun.
a) common b) mass c) proper d) collective



- viii) Rohan is _____ cleverest student I have ever seen.
 a) an b) the c) a d) zero article
- ix) Rohini took _____ degree in commerce from Solapur University.
 a) an b) a c) the d) zero article
- x) Leela does all her work _____ great care.
 a) on b) in c) for d) with

2. Answer following questions in **two-three** sentences : **10**

- i) What has happened to 'Big Joe' Brady's restaurant ?
- ii) Why did the narrator consider Miss. Krishna an annoying guest ?
- iii) Why can computers not 'think' in the same way as human beings ?
- iv) What was the policeman constantly doing with his stick ?
- v) Describe the different types of bangles which the bangle-sellers carry.
- vi) What is the speaker's attitude towards those that he fights against ?

3. A) Write brief answers to the following questions (**any 2**) : **6**

- i) What sort of relationship did Bob and Jimmy share ?
- ii) What do you understand of Miss. Krishna's childhood from the story ?
- iii) What are the myths regarding the intelligence of computers ?

B) Write answers to the following questions in short (**any 2**) : **4**

- i) How does the poet describe the faithful wife who is now middle-aged ?
- ii) What is the Irish airman's attitude towards the war he is fighting in ?
- iii) Why does the poet describe the bride's bangles as 'tinkling, luminous, tender and clear' ?

4. A) Write an essay describing an eventful cricket match which you have seen and experienced. **10**

OR

B) Write a paragraph of **five-six** sentences on each of the following :

- i) Solar energy
- ii) An exciting holiday.

5. Read the following passage carefully and write out a brief note on it : **10**

Technological progress has proved very harmful to environment. Drinking water and air are getting more and more polluted. Polluted water is a major cause of diseases like cholera, typhoid, dysentery and other intestinal troubles. Toxic elements like mercury, cyanides, arsenic and cadmium pollute water dangerously. Smoke emanating from the industrial units pollute air with oxides of carbon, sulphur and nitrogen. This has created a big health hazard in cities like Mumbai, Delhi and Calcutta. There is high incidence of T.B chest pains and bronchial and other respiratory diseases among children in these cities.



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B.Sc. – II (Semester – III) (Old) Examination, 2015
MICROBIOLOGY (Paper – VI)
Microbial Genetics and Biostatistics

Day and Date : Friday, 29-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

Instructions: 1) **All questions are compulsory.**
2) **Draw a neat labelled diagram whenever necessary.**

1. Rewrite the following sentences by choosing correct alternatives : 10
- i) Minimal genetic unit capable of recombination is called _____
a) muton b) cistron c) recon d) exon
 - ii) The right handed double helix structure represents _____ form of DNA.
a) A b) Z c) B d) C
 - iii) _____ is intercalating agent.
a) 5BU b) Nitrous acid
c) UV d) Acridine orange
 - iv) These are _____ codons specify for 20 amino acids.
a) 25 b) 50 c) 61 d) 16
 - v) _____ is required for conjugation.
a) Competance b) Sex pilli c) Phage d) None of these
 - vi) _____ phage mediate generalised transduction.
a) P22 b) O80 c) T4 d) M13
 - vii) _____ plasmids present *in Agrobacterium*.
a) R b) Ti c) F d) col
 - viii) _____ plays important role in photoreactivation.
a) Photolyase b) Methylase c) Endonuclease d) Exonuclease



- ix) 2-Aminopurine is base analogue of _____
a) Thymine b) Cysteine c) Adenine d) Uracil
- x) _____ discovered process of transduction.
a) Griffith b) Zinder and Lederberg
c) Watson and Crick d) Beadle and Tatum

2. Define **any five** of the following : **10**
- a) Muton
 - b) Split genes
 - c) F plasmids
 - d) Photoreactivation
 - e) Thymine-Thymine dimer
 - f) Application of plasmids.
3. A) Write **any two** of the following : **6**
- 1) Define Spontaneous mutation and describe in detail fluctuation test.
 - 2) Describe fate of exogenote.
 - 3) Hfr.
- B) What is genetic code ? Explain properties of genetic code. **4**
4. Write **any two** of the following : **10**
- 1) Describe in detail nature and structure of B form of DNA.
 - 2) Describe in detail specialised transduction.
 - 3) Define Plasmids. Discuss in brief types of plasmids.
5. Write **any one** of the following : **10**
- A) Define Transformation. Explain in detail mechanism of transformation.
 - B) Define mutation. Explain in detail mechanism of mutation caused by base analogues nitrous acid and UV light.
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Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
CHEMISTRY (Paper – VII) (New)
Physical Chemistry

Day and Date : Thursday, 7-5-2015
Time : 11.00 a.m to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Draw neat diagram and give equation, wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of logarithmic tables and scientific calculator is allowed.**
(At Wts. : H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

1. Choose the most correct alternative and rewrite the sentence : 10

- 1) The equation $\lambda_v = \lambda_\infty - b\sqrt{c}$ is known as _____
a) Arrhenius equation b) Bragg's equation
c) Onsagar equation d) None of these
- 2) In SI units, dipole moment is of the order of _____ Coulomb-meter.
a) 10^{-30} b) 10^{-20} c) 10^{+30} d) 10^{+20}
- 3) The unit cell of NaCl crystal contains _____ molecules.
a) one b) two c) three d) four
- 4) The mixing process is accompanied by _____ in entropy.
a) decreases b) increase
c) remain constant d) none of these
- 5) Ebonite is an example of _____
a) conductor b) insulator
c) electrolyte d) none of these
- 6) Entropy of a pure crystalline solid is zero at _____
a) 100°C b) 300°C c) 273°C d) -273°C
- 7) CO_2 and CS_2 have zero dipole moments, hence their expected structure is _____
a) linear b) non-linear
c) angular d) none of these
- 8) Electric current is carried in the solution by _____
a) atoms b) ions c) molecules d) electrons



9) If the plane of crystal cuts the two coordinate axes and is parallel to third axis, then it is known as _____ plane.

- a) cubic
b) cubic diagonal
c) simple
d) diagonal

10) Reciprocal of resistance is known as _____

- a) specific resistance
b) conductance
c) equivalent conductance
d) molecular conductance

2. Answer **any five** of the following :

10

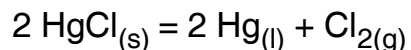
- i) What is ionic product of water ?
- ii) State third law of thermodynamics.
- iii) Define the term, equivalent conductance.
- iv) State Snell's law.
- v) State the law of constancy of interfacial angle.
- vi) What are the two types of conductors ?

3. A) Answer **any two** of the following :

6

- i) What are the advantages of moving boundary method ?
- ii) Explain the term distortion polarisation.
- iii) Explain equivalent conductance at infinite dilution.

B) Calculate the standard entropy change accompanying the following reaction



$$(S_{\text{HgCl}}^{\circ} = 98.32, S_{\text{Cl}_2}^{\circ} = 222.95, S_{\text{Hg}(l)}^{\circ} = 77.4).$$

4

4. Answer **any two** of the following :

10

- i) Describe the structure of NaCl on the basis of Bragg's equation.
- ii) Describe the method of determination of refractive index of a liquid by Abbe's refractometer.
- iii) State Kohlrausch law. How it is used to determine degree of dissociation of weak electrolyte ?

5. Answer **any two** of the following :

10

- i) Discuss in detailed Hittorf's rule.
 - ii) Derive an expression for entropy change for an ideal gas as a function of V and T.
 - iii) Explain with suitable examples, Weiss indices and Miller indices.
-



Seat No.	
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B.Sc. – II (Semester – IV) (New) Examination, 2015
COMPUTER SCIENCE
Paper – VII (Data Structures)

Day and Date : Thursday, 7-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N.B. : 1) ***All questions are compulsory.***
2) ***Figures to the right place indicate full marks.***

1. Choose correct alternatives : **10**
- 1) _____ works in FIFO manner.
a) Stack b) Queue c) Tree d) Linked list
 - 2) Single node in binary tree may contain more than two childrens.
a) True b) False
 - 3) To insert new node in-between two nodes of doubly linked list, _____ pointers fields we have to set.
a) One b) Two c) Three d) Four
 - 4) _____ sort is not example of exchange sort technique.
a) Bubble b) Selection c) Radix d) Shell
 - 5) Push () operation of Stack becomes successful if stack is _____
a) Full b) Not full c) Not created d) Both a) and c)
 - 6) _____ searching requires maximum key comparisons.
a) Linear b) Binary c) Hashing d) Both b) and c)
 - 7) Possible binary tree with 4 nodes is _____
a) 14 b) 41 c) 15 d) 51
 - 8) 'Header Node' in linked list always holds address of _____ node.
a) Middle b) First c) Second d) Last



- 9) _____ data structure is used for scheduling of resources in computer.
 a) Array b) Stack c) Queue d) Linked list
- 10) _____ search requires extra auxiliary storage for searching.
 a) Linear b) Sequential
 c) Indexed Sequential d) Binary

2. Answer **any five** of the following : **10**
- 1) Differentiate between array and linked list.
 - 2) Draw binary expression tree for expression : $((A - B)^* (X/Y) - (M + N))/P$.
 - 3) Why linked list is called as Dynamic and linear data structure ?
 - 4) What is Hashing ? Write its advantage.
 - 5) What is Stack ? List out its different applications.
 - 6) What is "Extended Binary Tree" ?
3. A) Attempt **any two** of the following : **6**
- 1) How will you check entered expression is valid or not using stack ?
 - 2) Explain insert () and remove () operation of linear queue.
 - 3) Write a program which finds sum of all elements of two dimensional array.
- B) Explain, how stack and queue are implemented using linked list. **4**
4. Answer **any two** of the following : **10**
- 1) Write a program that implements selection sort method.
 - 2) Explain "Threaded Binary tree" with its types.
 - 3) Implement function that reverses singly linear linked list.
5. Answer **any two** of the following : **10**
- 1) What is multiway search tree ? Explain B^- Tree and B^+ Tree in details.
 - 2) Explain "Radix Sort" method in details.
 - 3) What is Binary Search Tree ? Explain its following operations :
 - I) count_total()
 - II) count_leaf()
-

Seat
No.

B.Sc. – II (Semester– IV) Examination, 2015
CHEMISTRY (New)
Analytical and Industrial Inorganic Chemistry (Paper – VIII)

Day and Date : Friday, 8-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** labelled diagram and give equations **wherever necessary.**
3) Figures to **right** indicate **full marks.**

1. Select the most correct alternative and rewrite the following sentences : **10**
- 1) The reagent of known concentration is known as
a) titrant b) titrand c) titre d) titrate
 - 2) Methyl orange is _____ indicator.
a) metallochromic b) self c) acid-base d) adsorption
 - 3) A reagent which bring about precipitation is called as
a) precipitant b) precipitate c) coagulant d) seeding agent
 - 4) Aging is nothing but process of
a) nucleation b) digestion c) ignition d) coagulation
 - 5) Purest form of iron is
a) cast b) pig c) steel d) wrought
 - 6) The optimum condition for the best yield of ammonia w.r.t. concentration of $N_2 : H_2$ is
a) 3 : 1 b) 1 : 3 c) 2 : 3 d) 1 : 1
 - 7) Oleum is nothing but
a) 98% H_2SO_4 b) Conc. H_2SO_4 c) Pyrosulphuric acid d) All of these
 - 8) Sedimentation is a _____ process.
a) Chemical b) Biological c) Coagulation d) Settling
 - 9) Adsorption theory of catalyst was introduced by
a) Becker b) Faraday c) Frank d) Bergelius
 - 10) A substance which retards the rate of reaction is called
a) negative catalyst b) poisoner c) autocatalyst d) promoter

P.T.O.



2. Answer **any five** of the following : 10
- i) Define the terms :
 - a) Nucleation
 - b) Ageing
 - ii) Explain role of aluminum in inorganic analysis.
 - iii) Explain induced catalysis with suitable example.
 - iv) Give advantages of L.D. process.
 - v) Discuss the physico-chemical principle in the manufacture of ammonia by Haber's process w.r.t. temperature only.
 - vi) Write only balanced chemical reactions in the manufacture of sulphuric acid by contact process.
3. A) Answer **any two** of the following : 6
- i) Discuss Ostwald's theory of acid-base indicator.
 - ii) Write note on post precipitation.
 - iii) Mention the parameters of potability of water.
- B) Draw a neat labelled diagram for the manufacture of ammonia by Haber's process and mention optimum conditions. 4
4. Write short notes on **any two** of the following : 10
- i) Intermediate compound formation theory
 - ii) Bessemer process
 - iii) Ion exchange process.
5. Answer **any two** of the following : 10
- i) With the help of neutralisation curve explain the choice of indicator for titration of strong acid and strong base.
 - ii) Explain the process of precipitation.
 - iii) Discuss the role of metallochromic indicators.
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**B.Sc. (Computer Sci.) – II (Semester – IV) (New) Examination, 2015
SYSTEM ANALYSIS AND DESIGN (Paper – VIII)**

Day and Date : Friday, 8-5-2015
Time :3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory.**
2) **Figures to the right place indicate full marks.**


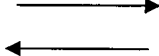


1. Choose correct alternatives : **10**
- 1) _____ is a system which is self contained.
 - a) Open system
 - b) Closed system
 - c) Both a) and b)
 - d) None of these
 - 2) Which of the following is not related with system analyst ?
 - a) Collection of requirement
 - b) User training
 - c) Creating model
 - d) Programming
 - 3) In the parallel-system method, the new system is set to work alongside the old one.
 - a) True
 - b) False
 - 4) A system flowchart depicts the flow of data through all parts of system with minimum of details.
 - a) True
 - b) False
 - 5) Attribute is represented by _____
 - a) Rectangle
 - b) Ellipse
 - c) Diamond
 - d) None of these
 - 6) The _____ is a data structure in which all non-key data elements are fully functionally dependent on the primary key.
 - a) 1NF
 - b) 2NF
 - c) 3NF
 - d) 4NF
 - 7) An output must convey information about _____
 - a) Past activities
 - b) Current status
 - c) Future Projections
 - d) All of these



8) The interconnection and interaction between the subsystems are termed as interface.

- a) True b) False

9) _____ symbol is used data flow.

- a)  b)  c)  d) 

10) The purpose of System Testing is to identify and correct errors in the candidate system.

- a) True b) False

2. Answer **any five** of the following : **10**

- 1) Define Deterministic System.
- 2) Why Normalization is necessary ?
- 3) What is Flowchart ?
- 4) State disadvantage of Sequential File Organization.
- 5) What is Implementation ?
- 6) What is Attribute ?

3. A) Answer **any two** of the following : **6**

- 1) Give the advantage of Decision Table.
- 2) Explain characteristics of system.
- 3) Explain interpersonal skills of System Analyst.

B) Write short note on Record Review. **4**

4. Answer **any two** of the following : **10**

- 1) State design principles of output.
- 2) State and explain selection criteria for software selection.
- 3) Explain Feasibility study in detail.

5. Answer **any two** of the following : **10**

- 1) Explain First Normal Form (1NF), Second Normal Form (2NF) and Third Normal Form (3NF) with example.
- 2) Explain role of System Analyst.
- 3) Draw DFD for Payroll System.



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B.Sc. (Part – II) (Semester – IV) Examination, 2015
PHYSICS (New)
Optics (Paper – VII)

Day and Date : Saturday, 9-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B. :**
- i) **All questions are compulsory.**
 - ii) **Figures to the right indicate full marks.**
 - iii) **Use of log table or calculator is allowed.**
 - iv) **Neat diagrams must be drawn whenever necessary.**
 - v) **Answer to every question must begin on a new page.**

1. Select and write the most appropriate answer from the given alternatives for each subquestion. 10

i) The relation between longitudinal magnification m_x and lateral magnification m_y for an optical system is _____

a) $m_x = m_y^2$

b) $m_x^2 = m_y$

c) $m_x = m_y$

d) $m_x^3 = m_y$

ii) For optical system, the relation between focal lengths and refractive indices is _____

a) $\frac{f_1}{f_2} = \frac{\mu_1}{\mu_2}$

b) $f_1 f_2 = \mu_1 \mu_2$

c) $\frac{f_1}{f_2} = -\frac{\mu_1}{\mu_2}$

d) $\frac{f_1}{f_2} = \frac{\mu_2}{\mu_1}$

iii) In Michelson's interferometer, interference is obtained by division of _____

- a) Wavefront b) Amplitude c) Wavelength d) Phase

iv) For a zone plate

a) $f_{nR} < f_{nY} < f_{nV}$

b) $f_{nR} > f_{nY} > f_{nV}$

c) $f_{nR} = f_{nY} = f_{nV}$

d) $f_{nR} = f_{nY} > f_{nV}$



- v) The radius of Fresnel's half period zone is directly proportional to the _____
- a) natural number b) square root of natural number
c) odd number d) square root of odd number
- vi) The resolving power of grating is independent of _____
- a) Grating element
b) Order of spectrum
c) Total number of lines on grating
d) None of above
- vii) The resolving power of prism of refractive index μ and base length 't' for a given wavelength λ can be expressed on _____
- a) $t \frac{d\mu}{d\lambda}$ b) $t \frac{d\lambda}{d\mu}$ c) $\frac{1}{t} \cdot \frac{d\mu}{d\lambda}$ d) $2t \frac{d\lambda}{d\mu}$
- viii) A half wave plate produces a phase difference _____ between O-rays and E-rays.
- a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) 2π d) π
- ix) For positive crystal, except along the optic axis _____
- a) $V_e < V_o$ b) $V_e = V_o = 0$
c) $V_e > V_o$ d) $V_e = V_o = 1$
- x) The refractive index of the core of graded index fibre varies about the axis in _____
- a) Parabolic manner b) Spherical manner
c) Linearly d) Cylindrical

2. Answer **any five** of the following :

10

- i) Prove that $\alpha f_1 + \beta f_2 = 0$.
- ii) Define visibility of fringes.
- iii) What is zone plate ? How it is prepared ?
- iv) State Rayleigh's criterion for resolution.
- v) Draw a diagram for wave surface in positive and negative crystal.
- vi) Define 'numerical aperture'. State its unit.



3. A) Answer **any two** of the following : **6**
- i) Distinguish between magnification and resolution.
 - ii) Describe polarimeter experiment to determine the specific rotation of an optically active solution.
 - iii) Calculate the radius of the first zone in a zone having a focal length 15 cm for a monochromatic light of wavelength 6000 A.U.
- B) Explain formation and working of fibre optic communication system. **4**
4. Answer **any two** of the following : **10**
- i) Derive an expression for resolving power of a grating.
 - ii) Explain how a zone plate acts like a lens having multiple foci. Derive an expression for its focal length.
 - iii) Describe the construction and working of NiCol prism.
5. Answer **any one** of the following : **10**
- i) Describe the construction and working of a Michelson's interferometer. How it can be used for measurement of difference in wavelengths between two closer lines ?
 - ii) Obtain an expression for equivalent focal length of a coaxial lens system. Two thin convex lenses of focal length 20 cm each are placed coaxially and are separated by a distance of 20 cm. Find the equivalent focal length and the position of principal points.
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Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
BIOCHEMISTRY
Nutrition and Metabolism (New) (Paper – III)

Day and Date : Saturday, 9-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Write biochemical reactions wherever necessary.**

1. Write following sentences selecting most correct answer from given option : **10**
- 1) _____ is a component of thyroxine hormone.
a) Iron b) Cobalt c) Iodine d) Magnesium
 - 2) For determination of calorific value of food, _____ means ether extractable material present in food.
a) carbohydrate b) fat c) protein d) mineral salts
 - 3) The high energy compound phosphoenol pyruvate is generated in _____
a) Glycolysis b) TCA cycle
c) Respiratory chain d) β -oxidation of fats
 - 4) _____ can accept or donate one proton at a time.
a) FAD b) NAD^+
c) CoQ_{10} d) Non-heme iron protein
 - 5) _____ functions as a carrier-catalyst in TCA cycle.
a) Acetyl CoA b) Oxaloacetate
c) Citrate d) Pyruvate
 - 6) Excess dietary carbohydrates are stored as glycogen in _____
a) Kidney b) Lungs c) Heart d) Liver
 - 7) Alanine transaminase converts alanine into _____
a) acetyl CoA b) pyruvic acid
c) α -ketoglutarate d) citric acid
 - 8) Knoop's β -oxidation is a process for oxidation of _____
a) cholesterol b) carbohydrates
c) proteins d) fatty acids



9) Bicarbonate is a principal buffer system of _____

- a) blood b) erythrocytes
 c) intracellular fluid d) urine

10) _____ plays important role in regulating electrolyte and water balance of body.

- a) Lungs b) Liver c) Kidney d) Skin

2. Answer **any five** from below : **10**

- 1) Define 'nitrogen balance' in metabolism.
- 2) What is meant by metabolic acidosis in the body ?
- 3) Name two molecules those absorb protons and two molecules those do not absorb protons in respiratory chain.
- 4) What is glycogenesis ? When does it takes place ?
- 5) Name two unusual and two usual amino acids involved in urea cycle.
- 6) State reasons of over hydration of body.

3. A) Attempt **any two** : **6**

- 1) Discuss essential and non-essential amino acids in diet.
- 2) Explain generation of ATP from phosphoenol pyruvate.
- 3) How are H^+ ions excreted as NH_4^+ ions by renal tubules ?

B) Write a note on – energetics of TCA cycle. **4**

4. Answer **any two** : **10**

- 1) With biochemical reactions explain urea cycle.
- 2) Describe different component involved in respiratory chain.
- 3) Explain biosynthesis of palmitic acid.

5. Attempt **any two** : **10**

- 1) Discuss the role of protein in diet.
- 2) How is the calorific value of food components calculated ?
- 3) How different buffers regulate the pH of blood ?



SLR-R – 147

Seat
No.

B.Sc. (Part – II) (Semester – IV) (New) Examination, 2015
PLANT PROTECTION (Paper – III)
Introduction to Weeds and Non-Insect Pests

Day and Date : Saturday, 9-5-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** I) **All** questions carry **equal** marks.
II) Figures to the **right** indicate **full** marks.
III) Draw **neat** and labelled diagrams **wherever** necessary.
IV) **All** questions are **compulsory**.

1. Choose correct alternative and rewrite the sentences : (1×10=10)
- 1) Weeds compete with crop plants for
 - a) Nutrients
 - b) Space
 - c) Sunlight and moisture
 - d) All the above
 - 2) Weeds are the reservoirs of
 - a) Pests
 - b) Diseases
 - c) Food
 - d) Both a) and b)
 - 3) The weed striga lutea has longevity of about _____ years.
 - a) 10
 - b) 15
 - c) 5
 - d) 20
 - 4) Euphorbia hirta belongs to the family
 - a) Euphorbiaceae
 - b) Amaranthaceae
 - c) Asteraceae
 - d) Papaveraceae
 - 5) Parthenium hysterophorus produces as many as _____ seeds per plant.
 - a) 2000-3000
 - b) 10,000-20,000
 - c) 5000-6000
 - d) 40,000
 - 6) Orobanche sp. is _____ parasite.
 - a) partial root
 - b) total root
 - c) partial stem
 - d) total stem

P.T.O.



7) The seeds of _____ weeds are mainly dispersed by animals.

- a) Tribulus sp
- b) Achyranthes sp
- c) Striga sp
- d) Both a) and b)

8) _____ is annual type.

- a) Chenopodium sp
- b) Cyperus sp
- c) Alternanthera sp
- d) Cynodon sp

9) _____ are the cultural methods of weed control.

- a) field sanitation
- b) crop rotation
- c) mulching
- d) all the above

10) Ammonia buccifera is the weed of

- a) Dry lands
- b) Garden lands
- c) Wet lands
- d) None of these

2. Answer **any five** of the following :

(5×2=10)

- I) Define nematicides.
- II) State the names of poisonous weeds.
- III) Write the morphology of cynodon dactylon.
- IV) State the examples of weeds dispersed by water.
- V) What is meant by quantitative loss ?
- VI) State the nature of damage caused by birds.

3. A) Answer **any two** of the following :

(2×3=6)

- I) Give the control measures of rats in storage.
- II) State the properties of weedicides.
- III) Give the importance of crop rotation.

B) Give the morphology and dispersal of seeds of portulaca sp.

4

4. Answer **any two** of the following :

(2×5=10)

- I) Classify the weeds based on ecology.
- II) Add a note on weed seed dispersal by air.
- III) Describe any one source of microbial weed control.

5. Answer **any two** of the following :

(2×5=10)

- I) Describe morphology, reproductive ability and control of cyperus rotundus.
 - II) Classify the weedicides chemical nature.
 - III) Describe the mode of infection and management of nematodes.
-



Seat No.	
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B.Sc. – II (Sem. – IV) (New) Examination, 2015
PHYSICS (Paper – VIII)
Modern Physics

Day and Date : Monday, 11-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :**
- i) **All questions are compulsory.**
 - ii) **Figures to the right indicate full marks.**
 - iii) **Use of log table or calculator is allowed.**
 - iv) **Neat diagrams must be drawn whenever necessary.**

1. Select correct alternative from the following : 10

- i) According to special theory of relativity, the velocity of light in free space is
 - a) Increases
 - b) Decreases
 - c) Remains constant
 - d) Zero
- ii) A clock will appear to run more and more slow if relative velocity between clock and observer
 - a) Decreases
 - b) Increases
 - c) Remains same
 - d) Becomes zero
- iii) The relation between group velocity (ω) and particle velocity (v) is
 - a) $\omega = \frac{1}{v}$
 - b) $\omega^2 = \frac{1}{v}$
 - c) $\omega = v^2$
 - d) $\omega = v$
- iv) The theory of matter waves was proposed by
 - a) Einstein
 - b) Compton
 - c) De-Broglie
 - d) Newton
- v) Anamolous Zeeman effect produces when external magnetic field applied to spectral lines is
 - a) Weak
 - b) Strong
 - c) Zero
 - d) Infinite
- vi) Spin quantum number associated with single electron is
 - a) Zero
 - b) One
 - c) One half
 - d) Two
- vii) The value of change in Compton wavelength $d\lambda =$
 - a) 0.0242 AU
 - b) 0.242 AU
 - c) 2.42 AU
 - d) 24.20 AU



- viii) In Compton scattering the wavelength of scattered radiations
a) Becomes zero b) Decreases c) Remains same d) Increases
- ix) The common material used as a fuel in reactor is
a) Cadmium b) Lanthanum c) Lithium d) Uranium
- x) In chain reaction if effective multiplication factor $K = 1$, then the size and mass of core is
a) Critical b) Super critical
c) Sub critical d) None of these

2. Answer **any five** of the following : 10
- i) State postulates of Einstein's special theory of relativity.
 - ii) State any two hypothesis of matter waves.
 - iii) State Pauli's exclusion principle.
 - iv) State Hund's rule.
 - v) Write any one neutron induced reaction.
 - vi) What is nuclear fission ?
3. A) Answer **any two** of the following : 6
- i) Write note on L-S and J-J coupling.
 - ii) Explain quantum numbers associated with vector atom model.
 - iii) A particle is moving with velocity 150 m/s. Calculate phase velocity and group velocity of matter waves.
- B) Explain construction and working of Stern and Gerlach experiment. 4
4. Answer **any two** of the following : 10
- i) Derive Einstein's mass energy relation.
 - ii) Obtain Bohr's quantum condition on the basis of matter waves.
 - iii) What is nuclear reactor ? Explain in short nuclear reactor with labelled diagram.
5. Answer **any one** of the following : 10
- i) Explain Michelson-Morley experiment and obtain equation for fringe width.
 - ii) What is Compton effect ? Obtain an expression for change in wavelength of scattered radiations.
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Seat No.	
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B.Sc. II (Semester – IV) Examination, 2015
BIOCHEMISTRY (Paper – IV) (New)
Molecular Biochemistry and Diseases

Day and Date : Monday, 11-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw neat diagrams wherever necessary.*

1. Write following sentences selecting most correct answer from given options : **10**
- 1) – GTΨC- sequence of bases is present in every _____
a) mRNA b) tRNA c) rRNA d) cDNA
 - 2) RNA contains _____ base, which is absent in DNA.
a) Adenine b) Guanine c) Cytosin d) Uracil
 - 3) The process of DNA biosynthesis is called _____
a) replication b) transcription c) translation d) transduction
 - 4) _____ is not a terminating codon.
a) AUG b) UAG c) UGA d) UAA
 - 5) The enzyme reverse transcriptase is used for preparation of _____
a) hnRNA b) mRNA
c) c-DNA d) plasmid pBR 322
 - 6) Vaccination is a type of _____ immunity.
a) natural passive b) artificial active
c) natural active d) artificial passive
 - 7) Insuline molecule contains _____ polypeptide chains.
a) 2 b) 3 c) 4 d) 6
 - 8) Tumor markers are used to detect _____
a) tumor virus b) cancer c) tumor size d) AIDS



- 9) HIV genome is a diploid _____
 a) ssRNA b) ssDNA c) dsDNA d) dsRNA
- 10) _____ cancer is associated with Human Papilloma Virus (HPV).
 a) Colon b) Breast c) Lung d) Cervix

2. Answer **any five** from below : **10**

- 1) What will happen if the initiating reading frame is not correctly established during protein biosynthesis ?
- 2) What are the racial differences in innate immunity ?
- 3) How does body reacts with HIV during early acute phase ?
- 4) What is booster dose for immunisation ?
- 5) What are cloning vectors ? Name such two vectors.
- 6) What do you understand by metastasis of cancer ?

3. A) Attempt **any two** : **6**

- 1) Discuss-Carcinoembryogenic Antigen (CEA).
- 2) Describe crisis phase of AIDS.
- 3) What is juvenile diabetes (IDDM) ?

B) Draw a labelled diagram of plasmid pBR 322. **4**

4. Answer **any two** from below : **10**

- 1) Explain the process of transcription.
- 2) How does HIV infects the body's immune system ?
- 3) Discuss about restriction endonuclease enzymes.

5. Attempt **any two** from the following : **10**

- 1) Describe natural immunity and its mechanisms.
 - 2) Write an account of mechanism of action of insulin and management of diabetes.
 - 3) Differentiate between primary and secondary immune response and discuss clonal selection theory.
-



Seat No.	
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B.Sc. I (Semester – I) Examination, 2015
CHEMISTRY (Paper – I) (Old)
Physical Chemistry

Day and Date : Monday, 6-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** diagrams and give equations **wherever** necessary.
3) Figures to the **right** indicate **full** marks.
4) **Use** of logarithmic tables and scientific calculator is **allowed**.

1. Choose the most correct alternative for **each** of the following and rewrite the sentence :

10

- 1) Radioactive decay follows _____ order kinetics.
a) zero b) first c) second d) third
- 2) All natural processes are _____
a) non-spontaneous b) spontaneous
c) reversible d) cyclic
- 3) Integration of dx is _____
a) x b) x + c c) x – c d) c
- 4) Decomposition of N_2O_5 is an example of _____ order reaction.
a) zero b) second c) first d) third
- 5) Entropy of the universe tends to _____
a) decrease b) increase
c) remain constant d) none of these
- 6) The unit of gas constant, R is
a) J/K/mol b) J-K/mol
c) $J^{-1}K^{-1}mol^{-1}$ d) All of these



- 7) The compressibility factor z for an ideal gas is
- | | |
|-----------------|---------------------|
| a) zero | b) greater than one |
| c) equal to one | d) less than one |

8) $\frac{dy}{dx}(x^n) =$

- | | |
|----------------|--------------------|
| a) $x^n - 1$ | b) $n x^{n+1}$ |
| c) $n x^{n-1}$ | d) $(n-1) x^{n-1}$ |

- 9) Excluded volume is _____ times the actual volume of molecules.

- | | | | |
|------------------|------|------|------|
| a) $\frac{1}{2}$ | b) 2 | c) 3 | d) 4 |
|------------------|------|------|------|

- 10) Molecularity never be

- | | | | |
|-------------|---------|-------------|-----------------|
| a) negative | b) zero | c) infinity | d) All of these |
|-------------|---------|-------------|-----------------|

2. Answer **any five** of the following :

10

- 1) Give any two statements of second law of thermodynamics.
- 2) What do you mean by definite integral ?
- 3) For a second order reaction, plot a graph of $\log \frac{b(a-x)}{a(b-x)}$ against t . Mention slope.
- 4) Write any two postulates of kinetic theory of gases.
- 5) Distinguish between order and molecularity of a reaction.
- 6) What do you mean by an isotherm ?

3. A) Answer **any two** of the following :

6

- 1) Give the characteristics of second order reaction.
- 2) Mention simple rules of integration.
- 3) What are the requirements for liquefaction of gases ?

- B) A second order reaction where initial concentrations of the both reactants same is half completed in 40 minute. In how much time it will be 90% completed ?

4



4. Answer **any two** of the following : **10**

- 1) Explain Andrew's isotherms for CO_2 gas.
- 2) Mention various methods used for the determination of the order of a reaction. Describe Ostwald's isolation method.
- 3) What is Carnot's cycle ? Derive an expression for the efficiency of Carnot's cycle.

5. Answer **any two** of the following : **10**

- 1) Define the term intercept. Give the characteristics of intercept.
 - 2) Derive the expression for rate constant for second order reaction where initial concentrations of the reactants are same.
 - 3) What do you mean by pseudo-unimolecular reactions ? Explain this with an example of hydrolysis of methyl acetate in presence of an acid.
-



SLR-R – 150

Seat
No.

B.Sc. – II (Semester – IV) Examination, 2015
PLANT PROTECTION
Insect Pests and Their Management (New) (Paper – IV)

Day and Date : Monday, 11-5-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** labelled diagrams **wherever** necessary.
3) **All questions carry equal marks.**
4) Figures to the **right** indicate **full marks.**

1. Rewrite the sentences by choosing **correct** alternative : **(1×10=10)**

- 1) _____ obtained from Chrysanthemum Cinariaefolium is most promising insecticide.
a) Nicotine b) Rotenene c) Pyrethrine d) Nimbin
- 2) Chemicals having the property of inhibiting the feeding of certain insect pests is called
a) repellents b) attractants
c) pheromones d) antifeedants
- 3) The Brinjal crop is generally attacked by _____ pest.
a) Grass hopper b) Stem borer c) Fruit borer d) Aphids
- 4) Rice Weevil is the common pest of
a) Oil seeds b) Pulses
c) Fruit trees d) Stored grains
- 5) Chilo partellus is the scientific name of
a) Stem borer b) Fruit borer c) Woolly aphids d) White grubs
- 6) _____ is not a Botanical antifeedant.
a) Margosa b) Pyrethrum
c) Carbamate d) Solanum alkaloids
- 7) The insecticides are classified on the basis of
a) Mode of action b) Chemical nature
c) Nature of formulations d) All the above

P.T.O.



8) The crop losses caused by insects are generally measured by

- a) Quantitatively b) Qualitatively
c) Meters d) Both a) and b)

9) White grubs generally attacks _____ crop.

- a) Sugarcane b) Groundnut
c) Gram d) Rose

10) _____ is not a insect pest.

- a) Jassid b) Thrip c) Rat d) Red spider

2. Answer **any five** of the following : **(5×2=10)**

- I) Define chemosterilants.
- II) Give the marks of identification of white grubs.
- III) Give scientific names of rose and sugarcane.
- IV) Name only the inorganic insecticides
- V) Suggest the control measures of pod borer.
- VI) State the advantages of repellents.

3. A) Answer **any two** of the followings : **(2×3=6)**

- a) Classify insect pests based on nature of damage.
- b) State the general characters of typical insect w.v. to metamorphosis.
- c) Give the advantages of microbial insecticides.

B) Give scientific name, nature of damage and control of pulse beetle. **4**

4. Answer **any two** of the following : **(2×5=10)**

- A) Add a note on organic insecticides.
- B) Explain the principles of Pest Control.
- C) Give nature of damage, host range and management of woolly aphids.

5. Answer **any two** of the followings : **(2×5=10)**

- A) Give the mode of action of chemosterilants and attractants.
- B) Explain the mode of action of insecticides on respiratory and nervous system.
- C) Explain the aerial applications of pesticides.



Seat No.	
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B.Sc. II (Semester – IV) (New) Examination, 2015
STATISTICS (Paper – VII)
Continuous Probability Distributions – II

Day and Date : Tuesday, 12-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

N.B. : 1) **All questions are compulsory and carry equal marks.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative.

10

i) If $X \sim \beta_2(m, n)$ then $\frac{1}{X}$ has _____ distribution.

- a) $\beta_1(m, n)$ b) $\beta_2(n, m)$ c) $\beta_1(n, m)$ d) None of these

ii) Let r.v. $X \sim G(4, 2)$ then mode = _____

- a) 0.5 b) 0.25 c) 2 d) 0.125

iii) If $X \sim \text{poi}(m)$ then the probability distribution of $\frac{X-m}{\sqrt{m}}$ tends to $N(0, 1)$ as

- a) $n \rightarrow \infty$ b) $m \rightarrow \infty$ c) $\lambda \rightarrow 0$ d) None of these

iv) If $X \sim G(\alpha, \lambda_1)$ and $Y \sim G(\alpha, \lambda_2)$, X and Y are independent then the distribution of $\frac{X}{Y}$ is

- a) $\beta_1(n_1, n_2)$ b) $\beta_2(n_1, n_2)$ c) $F(n_1, n_2)$ d) None of these

v) If $t \sim t_n$ then the variate t^2 follows

- a) $F(n, 1)$ b) $F(1, n)$ c) $F(n, n)$ d) None of these



vi) Mean of the F distribution with n_1 and n_2 d.f. is

a) $\frac{n_2}{n_2 - 2}$

b) $\frac{n_1}{n_2 - 2}$

c) $\frac{n_2}{n_1 - 2}$

d) None of these

vii) Let $Z \sim N(0, 1)$ then $P(-1.96 < Z < 1.96) =$

a) 0.95

b) 0.01

c) 0.05

d) 0.99

viii) For chi-square distribution with 'n' degrees of freedom then

a) mean = variance

b) 2 mean = variance

c) mean = 2 variance

d) none of these

ix) The range of F-variate is

a) $-\infty$ to ∞

b) 0 to 1

c) 0 to ∞

d) None of these

x) If $X \sim \beta_1(5, 10)$ then H.M. =

a) $\frac{1}{3}$

b) $\frac{2}{7}$

c) 2

d) 0

2. Attempt **any five** of the following.

10

i) State any four properties of Normal distribution.

ii) Let X and Y be two i.i.d. gamma variates with parameters (16, 4) and (6, 3) resp. Identify the distribution of $Z = 8X + 3Y$ and find $E(z)$.

iii) Discuss the nature of probability curve of 't'-distribution with n.d.f.

iv) If $X \sim N(\mu, \sigma^2)$ then find the probability distribution of $aX + b$, where a and b are constants.

v) Show that uniform distribution is a particular case of beta distribution of first kind.

vi) Show that the central moments of odd order of 't' distribution are zero.



3. A) Attempt **any two** of the following. **6**
- i) Obtain mode of 't' distribution with n.d.f.
 - ii) State and prove additive property of chi-square distribution.
 - iii) Find mean and variance of the beta distribution of first kind.
- B) Find the harmonic mean of beta distribution of second kind. **4**
4. Attempt **any two** of the following. **10**
- i) State and prove additive property of gamma variates.
 - ii) Find mean and variance of 't' distribution with 'n' d.f.
 - iii) Find m.g.f. of gamma distribution with α and λ parameters.
5. Attempt **any one** of the following. **10**
- i) Derive the p.d.f. of students 't' distribution with n.d.f.
 - ii) If X and Y are two independent gamma variates with parameters (α, λ_1) and (α, λ_2) resp. Obtain the distributions of $U = X + Y$ and $V = \frac{X}{X + Y}$.
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SLR-R –152

Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
METEOROLOGY (Paper – III) (New)
Applied Climatology

Day and Date : Tuesday, 12-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) **All questions carry equal marks.**
2) **All questions are compulsory.**
3) **Draw neat and labelled diagrams wherever necessary.**
4) **Use of stencils is allowed.**

1. Choose the correct alternative :

10

- i) Weather is known as an average _____ conditions for a short period.
(Atmospheric, Hydrospheric, Biospheric, Lithospheric)
- ii) Fohn are the warm winds restricted to _____ mountains.
(Himalaya, Alps, Rockies, Andies)
- iii) The hot and humid climate of _____ is considered as worse for human settlements.
(Equatorial area, Temperate area, Polar area, Desert area)
- iv) Rice cultivation is common in _____ region.
(Equatorial, Monsoon, Mediterranean, Alpine)
- v) Plantation agriculture is confined to _____ region.
(Colonial, Under developed, Developed, Backward)
- vi) The temperature between 20 to 27 degree centigrade is known as _____ zone.
(Human comfort, Human uncomfot, Healthy, Unhealthy)
- vii) Satellites are useful for _____ forecasting.
(Weather, Climate, Paleo climate, Projected climate)

P.T.O.



- viii) In summer the isotherm generally show _____ trend over the land.
(Parallel, Pole ward bend, Equator ward bend, Ocean ward bend)
- ix) _____ bank is famous for the fishing in North Atlantic ocean.
(Dogger, Reserve, Oriental, Cooperative)
- x) Bombay high is famous for _____ petroleum.
(Deep sea fishing, Offshore fishing, Offshore drilling, Deep sea drilling)

2. Write short answers (**any five**) : **10**

- I) Define the term climate.
- II) Types of weather forecast.
- III) What is an isobar ?
- IV) What is an airmass ?
- V) What are the elements of weather ?
- VI) What is heat island ?

3. A) Write in short (**any two**) : **6**

- I) Fishing and climate.
- II) Urban climate in developed countries.
- III) Use of satellite in climatology.

B) Describe the role of climate in agricultural activities. **4**

4. Answer in short (**any two**) : **10**

- I) Effect of smog on health.
- II) Explain the historical background of weather forecasting.
- III) Blizzards in northern hemisphere.

5. Answer in short (**any two**) : **10**

- I) Offshore drilling
 - II) Local winds
 - III) Weather application to industry.
-

Seat
No.

B.Sc. – II (Semester – IV) Examination, 2015
GEOCHEMISTRY
Principles of Geochemistry (Paper – III) (New)

Day and Date : Tuesday, 12-5-2015

Max.Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

1. Select the most correct alternative from **each** of the following : **10**

- 1) Chemical equilibrium is _____ in nature.
a) Static b) Elastic c) Dynamic d) Kinetic
- 2) Acidic rock contains high percentage of _____
a) MgO b) CaO c) SiO₂ d) FeO
- 3) Petroleum is a mixture of _____
a) Nitro group b) Hydrocarbon
c) Amino group d) Ketonic group
- 4) Silica is a _____ clay minerals.
a) Positive b) Negative c) Zero d) No charge
- 5) At chemical equilibrium _____
a) $R_f = R_b$ b) $R_f \neq R_b$ c) $R_f > R_b$ d) $R_f < R_b$
- 6) According to Bronsted theory, acid is _____ donor.
a) Electron b) Ion c) Proton d) Neutron
- 7) Alkane contains _____ bonds.
a) Single b) Double c) Triple d) None of these
- 8) Adsorption is a _____ concept.
a) Bulk b) Surface c) Corner d) Dynamic



9) Law of mass action is applicable for _____ reaction.

- a) Reversible
- b) Irreversible
- c) Fast
- d) Slow

10) The chemical formula of gypsum is _____

- a) $MgSO_4$
- b) SiO_2
- c) $CaSO_4$
- d) Si_2O_7

2. Answer **any five** of the following :

10

- i) State and explain chemical equilibrium.
- ii) Give any two geological uses of acid and base.
- iii) Write the names of
 - a) $C_{10}H_8$
 - b) CH_3OH
- iv) Define :
 - a) gel
 - b) emulsion
- v) Write the chemical reaction during the hydrolysis of Na_2CO_3 .
- vi) Write the structural formula of
 - a) Glycine
 - b) Cyclohexane

3. A) Answer **any two** of the following :

6

- i) Write a short note on Bredig's arc method.
- ii) Give the types of hydrocarbon in petroleum.
- iii) Show that chemical equilibrium is dynamic in nature for the reaction

$$H_{2(g)} + J_{2(g)} \rightleftharpoons 2HI_{(g)}$$

B) Distinguish between true solution and colloidal solution.

4

4. Answer **any two** of the following :

10

- i) Write a short note on occurrence of carbon in rock.
- ii) Discuss clay mineral as colloids.
- iii) Distinguish between reversible and irreversible reaction.

5. Answer **any two** of the following :

10

- i) Explain electrophoresis.
- ii) Write a short note on origin of coal.
- iii) Discuss conventions of chemical equilibrium.



Seat No.	
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**B.Sc. (Part – II) (Semester – IV) (New) Examination, 2015
ZOOLOGY (Paper – VII)
Animal Diversity – IV**

Day and Date: Tuesday, 12-5-2015

Max. Marks : 50

Time: 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) *All questions are compulsory.*
2) *Draw neat labelled diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*

1. Select the appropriate answer and rewrite the sentences : 10
- 1) In case of _____ the skin is dry, rough and non-glandular.
a) Reptiles b) Birds c) Amphibians d) Mammals
 - 2) Gastric digestion take place in
a) Duodenum b) Stomach c) Colon d) Rectum
 - 3) Pulmonary artery carry _____ blood to the lungs.
a) Oxygenated b) Deoxygenated
c) Mixed d) Pure
 - 4) The _____ era is called as the golden age of reptiles.
a) Paleozoic b) Azoic c) Camozoic d) Mesozoic
 - 5) Fruit eating beak is found in
a) Parrot b) Woodpecker c) Duck d) Kingfisher
 - 6) Teeth of Poisonous snakes are called as
a) Fangs b) Sensory pits
c) Vertebrales d) Shields
 - 7) In case of Owl _____ feet are present.
a) Perching b) Raptorial c) Wadding d) Swimming
 - 8) _____ are egg laying mammals.
a) Monotremes b) Cats c) Rabbits d) Marsupials



- 9) Intelligence is function of
- a) Medulla oblongata
 - b) Olfactory lobes
 - c) Optic lobes
 - d) Cerebral hemispheres

- 10) $\frac{1003}{1003}$ is dental formula of
- a) Man
 - b) Sheep
 - c) Rat
 - d) Dog

2. Write short notes on (**any five**) : **10**
- i) Salient features of mammals.
 - ii) Functions of pancreas of rat.
 - iii) Latitudinal migration.
 - iv) Dentition of rat.
 - v) Characters of Poisonous snakes.
 - vi) Bile of rat.
3. A) Answer **any two** of the following : **6**
- 1) Poison gland of snake.
 - 2) Fruit eating beak of bird.
 - 3) First aid treatment of snake bite.
- B) Functions of blood of rat. **4**
4. Answer **any two** of the following : **10**
- 1) Describe uriniferous tubule of the rat.
 - 2) Mesozoic reptiles.
 - 3) Describe the process of gastric digestion in rat.
5. Answer **any one** of the following : **10**
- 1) Describe the brain of rat with functions of different parts.
 - 2) Describe affinities of monotremes.
-



Seat No.	
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B.Sc. – II (Sem. – IV) (New) Examination, 2015
STATISTICS (Paper – VIII)
Applied Statistics

Day and Date : Wednesday, 13-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

N.B. : 1) ***All questions are compulsory and carry equal marks.***
2) ***Figures to the right indicate full marks.***

1. Choose the correct alternative :

10

- i) Chance variation in respect of quality control of a product is
- Tolerable
 - Not effecting the quality of a product
 - Uncontrollable
 - All the above
- ii) The degrees of freedom for the paired t test statistic based on n pairs of observations is
- $2n - 1$
 - $n - 1$
 - $2(n - 1)$
 - None of these
- iii) To test for the mean of normal population based on a large sample the test statistic used is
- χ^2
 - t
 - normal
 - F
- iv) Student's t test is applicable only when
- The sample observations are independent
 - The sample is not large
 - The variable is normally distributed
 - All of these

P.T.O.



- v) Probability of selection varies at each subsequent draw in
- a) Sampling without replacement
 - b) Sampling with replacement
 - c) Both a) and b)
 - d) Neither a) nor b)
- vi) Chance or random variation in the manufactured product is
- a) Controllable
 - b) Not controllable
 - c) Both a) and b)
 - d) None of these
- vii) Which of the following is a simple hypothesis ?
- a) $H_0 : \mu < 5$
 - b) $H_0 : \mu > 5$
 - c) $H_0 : \mu \neq 5$
 - d) $H_0 : \mu = 5$
- viii) Simple random sample can be drawn with the help of
- a) Random number tables
 - b) Chit method
 - c) Lottery method
 - d) All the above
- ix) The Shewhart control charts are meant
- a) To detect whether the process is under statistical quality control
 - b) To find the assignable causes
 - c) To reflect the selection of samples
 - d) All the above
- x) Always the hypothesis under test is
- a) Null hypothesis
 - b) Alternative hypothesis
 - c) Simple hypothesis
 - d) Composite hypothesis

2. Answer **any five** of the following :

10

- i) Define a statistic giving two examples.
- ii) Define level of significance and critical region.
- iii) Explain the term defective.
- iv) What is product control ?
- v) Define Age Specific Death Rate (ASDR) and Age Specific Birth Rate (ASBR).
- vi) Explain meaning of Statistical Quality Control (SQC).



3. A) Answer **any two** of the following : **6**
- i) Explain the procedure to test for the mean of a normal population.
 - ii) Define simple and composite hypothesis.
 - iii) Show that in SRSWoR the probability of selecting a specified unit of the population at any given draw is equal to the probability of selecting it at the first draw.
- B) Prove the following : **4**
- Show that in case of Simple Random Sampling Without Replacement (SRSWoR) expected value of the sample mean is population mean.
4. Answer **any two** of the following : **10**
- i) Explain the criteria for detecting lack of control in \bar{X} and R charts.
 - ii) Explain Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR). Also state the limitations of GRR.
 - iii) Describe the test procedure for testing the equality of two population proportions.
5. Answer **any one** of the following : **10**
- 1) a) Explain the procedure of setting a control chart for number of defects when standards are not given.
 - b) Describe the direct method of obtaining standard death rate (STDR).
 - 2) Prove that in a simple random sampling without replacement sample mean square is an unbiased estimate of population mean square.
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B.Sc. – II (Semester – IV) (New) Examination, 2015
METEOROLOGY (Paper – IV)
(Meteorological Instruments)

Day and Date : Wednesday, 13-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Neat diagrams must be drawn wherever necessary.**
4) **Use of calculator or log table is allowed.**

1. Multiple choice questions :

10

- i) The float type; with automatic siphon, weighing gauges and tipping-bucket gauges are types of _____
a) hygrometers b) radiometers c) thermometers d) rain gauges
- ii) The float gauge is used to measure _____
a) temperature b) rainfall c) humidity d) pressure
- iii) The Six's thermometer is used to measure _____ temperature.
a) Minimum b) Maximum
c) Minimum and maximum d) Average
- iv) The relation connecting Kelvin's scale and Celsius scale is _____
a) $K = C + 273$ b) $K = C - 273$ c) $K = 273 * C$ d) $K = 273/C$
- v) Atmospheric pressure is measured using a _____
a) Thermometer b) Barometer c) Float gauge d) Anemometer
- vi) Aneroid barometer is used to measure atmospheric _____
a) Density b) Temperature c) Pressure d) Volume
- vii) Hooke's anemometer is used to measure _____
a) Wind velocity b) Temperature c) Pressure d) Humidity
- viii) The instrument used to detect direction of wind is known as _____
a) Wind vane b) Barometer c) Thermometer d) Hygrometer



- ix) Hair hygrometer is used to measure _____
- | | |
|----------------------|----------------------|
| a) Temperature | b) Absolute humidity |
| c) Relative humidity | d) Pressure |
- x) A thermopile consists of large number of _____ connected in series.
- | | |
|------------------|------------------|
| a) thermometers | b) radiometers |
| c) psychrometers | d) thermocouples |

2. Answer **any five** of the following : **10**
- Describe different types of rain gauges.
 - Why mercury is used in thermometers ?
 - What is wind ?
 - State and explain Seebeck effect.
 - What are advantages of aneroid barometer over Fortin's barometer ?
 - What are the factors affecting sensitivity and accuracy of a thermometer ?
3. A) Answer **any two** of the following : **6**
- Write a note on "the different temperature scales".
 - Draw neat diagram of automatic siphon gauge.
 - Draw neat labeled diagram of aneroid barometer. Describe its construction and working.
- B) Calculate atmospheric pressure in mb if reading of Fortin's barometer is 27 inch. (Given : density of Hg = 13.6 g/cc). **4**
4. Answer **any two** of the following : **10**
- With neat diagram explain radiation pyrometer.
 - With neat diagram explain construction and working of float gauge.
 - Write a note on 'Crooke's radiometer'.
5. Answer **any two** of the following : **10**
- Write a note on 'thermograph'.
 - With neat diagram explain construction and working of cup anemometer.
 - Write a short note on mercury barometer.
-



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B.Sc. II (Semester – IV) Examination, 2015
GEOCHEMISTRY (Paper – IV)
Chemistry of the Earth (New)

Day and Date : Wednesday, 13-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) *All questions are compulsory.*
2) *Figures to the **right** indicate **full** marks.*
3) *Draw **neat** diagram **wherever** necessary.*

1. Fill in the blanks with correct answer from given options. **10**

- 1) Hydration of ion is inversely proportional to its _____
(diameter, radius, charge, valency)
- 2) Core is mainly made up of _____
(Mg-Fe, Ni-Fe, Mn-Fe, Na-Fe)
- 3) Soil, whose diamensions are between _____ mm is fine grained sandy soil.
(2 and 0.2, 0.2 and 0.02, 0.02 and 0.002, < 0.002)
- 4) Pyroxene mineral convert to _____ mineral by oxidation and hydration.
(Kaolinite, Geothite, Calcite, Smectite)
- 5) _____ soil horizon is rich in organic matter (humus).
(A, C, D, R)
- 6) _____ type of clay structure has one tetrahedral layer linked with one octahedral layer.
(Smectite, Mont Morillonite, Soil, Kaolinite)
- 7) Shape of clay particle is _____
(rounded, tabular, scaly, angular)

P.T.O.



- 8) The process involving loss of electrons is
(oxidation, reduction, potential, redundant)
- 9) The composition of soil is
(solids, organisms, air, all of these)
- 10) The most soluble atmospheric gas in water is
(NO₂, SO₂, Ar, CO₂)

2. Answer **any five** of the following : **10**
- 1) What is pedalfer soil ?
 - 2) At what depth the asthenosphere is present ?
 - 3) Define Pollution.
 - 4) What is hydrogen ion concentration in pure water at 25°C ?
 - 5) Name the air pollutants.
 - 6) What is humus in soil ?
3. A) Answer **any two** of the following : **6**
- 1) Explain oxidation potential.
 - 2) Describe Carbonation process.
 - 3) What are iron sediments ?
- B) Explain modern classification of soil. **4**
4. Answer **any two** of the following : **10**
- 1) Explain geochemical cycle in brief.
 - 2) Porosity of soil.
 - 3) Eh-pH diagram.
5. Answer **any two** of the following : **10**
- 1) Types of soil texture.
 - 2) Formation of clay minerals.
 - 3) Explain soil pollution in brief.
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B.Sc. (Part – II) (Semester – IV) Examination, 2015
ZOOLOGY (Paper – VIII) (New)
Historology and Physiology

Day and Date : Wednesday, 13-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B.** : 1) **All questions are compulsory.**
2) Draw **neat and labelled diagrams wherever necessary.**
3) Figures to the **right** indicates **full marks.**

1. Select the appropriate answer from those given below of **each** question and complete the sentence.

10

- 1) _____ type of muscle found in mammalian heart.
 - a) Smooth
 - b) Skeletal
 - c) Cardiac
 - d) Non-straited
- 2) Glucagon hormone is secreted by _____ cells of Islets of Langerhans.
 - a) Alpha
 - b) Beta
 - c) Delta
 - d) Gamma
- 3) Glisson's capsule is found in _____ of mammal.
 - a) Pancreas
 - b) Liver
 - c) Kidney
 - d) Ovary
- 4) The tests performs the function of _____.
 - a) Spermatogenesis
 - b) Oogenesis
 - c) Glucogenesis
 - d) Glycogenesis
- 5) Oxytocin hormone is secreted by _____ of pituitary gland.
 - a) Adenohypophysis
 - b) Pars intermedia
 - c) Neurohypophysis
 - d) Pars tuburalis
- 6) The meaning of T.T.B. is _____.
 - a) A baby grown in T.B.
 - b) Fertilization and development in uterus
 - c) Fertilization in vitro and transplant in uterus
 - d) Fertilization and development in T.B.

P.T.O.



- 7) Cellular immunity is also called as _____
- a) B-cell immunity
 - b) A-cellimmunity
 - c) T-cellimmunity
 - d) H-cell immunity
- 8) _____ is intra uterine device.
- a) Condom
 - b) Copper – T
 - c) Pills
 - d) Jelly
- 9) The termination menstrual cycle is called as _____
- a) Menarch
 - b) Menopause
 - c) Puberity
 - d) Menstruction
- 10) Duration of full term pregnancy is lasts for _____ days.
- a) 130
 - b) 140
 - c) 200
 - d) 280

2. Answer **any five** of the following : **10**
- i) Role of Beta cells of Islets of Langerhans
 - ii) Functions of seminiferous tubules
 - iii) Kupffer cells of liver
 - iv) Columnar epithelium
 - v) Colostrum
 - vi) Role of coper – T.
3. A) Answer **any two** of the following : **6**
- i) Describe the female starilization.
 - ii) Describe the structure of graffian follicle.
 - iii) Describe the hormones secreted by neuro phypophysis.
- B) Describe the female sex hormones. **4**
4. Answer **any two** of the following : **10**
- i) Describe the hormonal control of lactation.
 - ii) Describe the cellular immunity.
 - iii) Describe the histology of uterus.
5. Answer **any one** of the following : **10**
- i) Describe the histological structure of mammalian kidney.
 - ii) What is pregnancy ? Describe the hormonal control of pregnancy.
-



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B.Sc. II (Semester – IV) (New) Examination, 2015
MATHEMATICS (Paper – VII)
Differential Equations

Day and Date : Thursday, 14-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

N.B. : 1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

1. Select the correct alternative for **each** of the following : **10**

1) The combined solution of the differential equation $p^2 - 7p + 12 = 0$ is _____

- a) $(y - 3x - c)(y - 4x - c) = 0$ b) $(y + 3x - c)(y - 4x - c) = 0$
c) $(y - 3x - c)(y + 4x - c) = 0$ d) $(y + 3x + c)(y + 4x + c) = 0$

2) The equation $y = 2px + f(p^2x)$ can be reduced to Clairauts form by putting

- a) $x = u^2$ and $y = v$ b) $x = 1/u$ and $y = 1/v$
c) $x^2 = u$ and $y^2 = v$ d) $x = u^2$ and $y = v^2$

3) The solution of the equation $(y - px)(p - 1) = 1$ is _____

- a) $y = x + c$ b) $y = cx + c$
c) $y = cx + c/c - 1$ d) $y = x + \frac{c}{c - 1}$

4) If $1 - P + Q = 0$ then $y = \underline{\hspace{2cm}}$ is a solution of $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = 0$

- a) x b) e^x c) e^{-x} d) e^{ax}

5) The substitution by which you can change the independent variable of the differential equation

$\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ is _____

- a) $z = e^{-\int p dx}$ b) $z = e^{-\int p dx}$
c) $z = e^{\int p dx}$ d) $z = \int e^{\int p dx}$

P.T.O.



6) If $P + Qx = 0$ then $u = \underline{\hspace{2cm}}$ is a solution of the equation

$$\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$$

- a) e^x b) x c) e^{-x} d) x^2

7) The C.F. of the solution of the differential equation $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = \log x$ is $\underline{\hspace{2cm}}$

- a) $y = c_1 + c_2 \log x$ b) $y = (c_1 + c_2 \log x)x$
 c) $y = c_1 x + c_2/x^2$ d) $y = 4x + c_2 x^2$

8) The differential equation $(ax + b)^2 \frac{d^2y}{dx^2} + a_0 (ax + b) \frac{dy}{dx} + a_1 y = X$ transforms to linear differential equations with constant coefficients by using the substitution $\underline{\hspace{2cm}}$

- a) $x = e^z$ b) $x = e^{-z}$
 c) $az + b = \log x$ d) $ax + b = e^z$

9) The differential equation $Pdx + Qdy + Rdz = 0$ is integrable if $\underline{\hspace{2cm}}$

a) $\begin{vmatrix} P & Q & R \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \end{vmatrix} = 0$

b) $\begin{vmatrix} P & Q & R \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial z} & \frac{\partial}{\partial y} \end{vmatrix} = 0$

c) $\begin{vmatrix} P & Q & R \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \end{vmatrix} = 0$

d) None of these

10) In the differential equation $Pdx + Qdy + Rdz = 0$, P, Q, R represents direction ratios of $\underline{\hspace{2cm}}$

- a) normal b) tangent c) curve d) none of these



2. Attempt **any five** of the following : 10

- a) Solve $y = 2p + 3p^2$.
- b) Explain the method of solving the equations which is solvable for P.
- c) State different methods of solving differential equation of second order.
- d) Find the solution of

$$\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1 - \cot x) = 0$$

e) Solve $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$

f) Test for integrability

$$ayz \, dx + bzx \, dy + cxy \, dz = 0$$

3. A) Attempt **any two** of the following : 6

a) Solve $x^2(y - px) = yp^2$.

b) Solve $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{x^2y^2z^2}$.

c) Solve $\frac{d^2y}{dx^2} - 2 \tan x \frac{dy}{dx} + 5y = 0$.

B) Define Clairauts equation and explain the method of its solution. 4

4. Attempt **any two** of the following : 10

a) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$.

b) Solve $x \frac{d^2y}{dx^2} - (2x - 1) \frac{dy}{dx} + (x - 1) y = 0$.

c) Explain the method of solving linear second order differential equations of the

type $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ where P, Q, R are functions of x only when one solution belonging to complementary function is known.



5. Attempt **any one** of the following :

10

a) Define homogeneous linear differential equations of order n. Explain the method of solving it.

b) Solve the equation

$$x^2 \frac{d^2y}{dx^2} + 7x \frac{dy}{dx} + 5y = x^5.$$



Seat No.	
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B.Sc. – I (Semester – I) Examination, 2015
COMPUTER SCIENCE (Old) (Paper – I)
Computer Fundamental – I

Day and Date : Monday, 6-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

1. Choose the correct alternatives :

10

- 1) _____ printer is called Page Printer.
a) Laser b) Inkjet c) Dot Matrix d) None of the above
- 2) _____ technology is used in first generation.
a) LSI b) Vacuum tubes
c) Transistor d) None of the above
- 3) Name of the display feature that highlights areas of screen which require operator attention ?
a) pixel b) cursor
c) reverse video d) dpi
- 4) _____ is called low-level language.
a) Machine language b) Assembly language
c) Both a) and b) d) None of these
- 5) _____ command are used to copy file.
a) CD b) Copy con
c) Command.com d) None of these
- 6) _____ is one of the scanning device.
a) Keyboard b) Joystick c) MICR d) None of these
- 7) To represent octal numbers base to _____ is used.
a) 8 b) 10 c) 2 d) 16

P.T.O.



- 8) _____ is the optical storage device.
a) Magnetic tape b) Hard disk c) Pen drive d) CD-ROM
- 9) _____ software manages computer hardware.
a) System b) Application c) Antivirus d) None of these
- 10) _____ is input device.
a) Light pen b) Monitor c) Printer d) Sound

2. Answer **any five** of the following : **10**
- 1) Define analog computer.
 - 2) Explain ASCII-7 code.
 - 3) Explain control unit.
 - 4) Explain fifth generation of computer.
 - 5) Explain application of computer.
 - 6) Explain Joysticks.
3. A) Answer **any two** of the following : **6**
- 1) Explain drum printer.
 - 2) Define MB, KB, bytes, bit, word.
 - 3) Explain ALU. Draw diagram.
- B) Differentiate Inkjet and Dot Matrix Printer. **4**
4. Answer **any two** of the following : **10**
- 1) Write a note on hexadecimal and decimal and write a procedure to convert hexadecimal to decimal and decimal to hexadecimal.
 - 2) Write note on magnetic disk.
 - 3) Write the difference between serial port and parallel port.
5. Answer **any two** of the following : **10**
- 1) Define operating system. Explain features of operating system.
 - 2) Explain types of computer.
 - 3) Write the difference between ROM and EPROM.
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B.Sc. (Part – II) (Semester – IV) Examination, 2015
BOTANY
Paper – VII : Plant Physiology and Cytogenetics (New)

Day and Date : Thursday, 14-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

- Instructions:** 1) **All questions carry equal marks.**
2) **Question 1 is compulsory.**
3) **Draw neat and labeled diagrams wherever necessary.**
4) **Figures to the right indicate full marks.**

1. Rewrite the following sentences using correct answer : 10
- 1) Who coin the term linkage ?
a) Correns b) Mendel c) Morgan d) de Vries
 - 2) The phenomono of linkage was first observed in
a) Lathirusodoratus b) Pisumsativum
c) Datura d) Mirabilis Jalapa
 - 3) Coupling and repulsion phenomenon was concerned with _____
a) Crossing over b) Mutation
c) Linkage d) All of these
 - 4) Linkage prevents _____
a) Homozygous condition b) Segregation of alleles
c) Hybrid formation d) Heterozygous condition
 - 5) Crossing over occurs during
a) Pachytene b) Diplotene c) Diakinesis d) Both b) and c)
 - 6) Complete linkage has been reported in
a) Maize b) Human female
c) Male drosophila d) Female drosophila
 - 7) _____ is the site of photochemical reaction.
a) Poly some b) Ribosome
c) Quanta some d) Chromosome



8) The translocation of organic substances through transport tissue is called _____

- a) Phloem transport b) Xylem transport
c) Both 'a' and 'b' d) None of these

9) _____ is an example of aerobic bacteria.

- a) Azatobacter b) Aerobacter
c) Clostridium d) Nostoc

10) The second phase of Calvin cycle is _____

- a) Reduction phase b) Carboxylation phase
c) Decarboxylation phase d) Regeneration phase

2. Answer **any five** of the following : **10**

- 1) Define photosynthesis.
- 2) What is phloem loading ?
- 3) What is kranz anatomy ?
- 4) Define nitrogen fixation.
- 5) Define linkage.
- 6) What is crossing over ?

3. A) Write **any two** of the following : **6**

- 1) Explain nitrogen fixation.
- 2) Give significance of crossing over.
- 3) Explain Calvin cycle.

B) Significance of Meiosis. **4**

4. Write **any two** of the following : **10**

- 1) Mechanism of crossing over.
- 2) What is duplication ? Explain with example.
- 3) Explain source-sink relationship.

5. Write **any one** of the following : **10**

- 1) Explain the symplastic phloem loading.
 - 2) What is translocation ? Give significance of chromosomal aberrations.
-



Seat No.	
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B.Sc. II (Semester – IV) Examination, 2015
MATHEMATICS (Paper – VIII)
Abstract Algebra (New)

Day and Date : Friday, 15-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **All questions carry equal marks.**

1. Choose the correct alternative of the following : 10

- 1) Alternating group A_7 is of order
 - a) 2520
 - b) 7
 - c) 360
 - d) None of these
- 2) $(\mathbb{Z}, -)$ is not a group since it does not satisfy following property
 - a) Closed
 - b) Associative
 - c) Identity
 - d) Inverse
- 3) If p/q and q/r then
 - a) r/p
 - b) r/q
 - c) p/r
 - d) q/p
- 4) A relation \sim is symmetric if for $p, q \in S$
 - a) $p \sim q \Rightarrow p \sim p$
 - b) $p \sim q \Rightarrow q \sim p$
 - c) $p \sim q \Rightarrow q \sim q$
 - d) None of these
- 5) A homomorphic mapping from $f : G \rightarrow G'$ is epimorphic if f is
 - a) into
 - b) onto
 - c) one-one
 - d) many-one
- 6) If N is normal subgroup of G , then for $a \in G$
 - a) $0(Ga) \setminus 0(Na)$
 - b) $0(Na) \setminus 0(a)$
 - c) $0(Ga) \setminus 0(a)$
 - d) None of these



- 7) The number of subgroups of the group Z_{20} is
 a) 6 b) 4 c) 3 d) 2
- 8) A finite group of prime order is
 a) cyclic b) normal
 c) not cyclic d) none of these
- 9) The number of units in $Z_7^\#$ is
 a) 1 b) 2 c) 3 d) 6
- 10) If H and K are subgroups of a group G, then HK is a subgroup of G iff
 a) $HK = KH$ b) $HK = G$
 c) $HK = H$ d) $KH = H$

2. Attempt **any five** of the following :

10

- 1) If $(G, *)$ is group then prove that identity of G is unique.
- 2) Define order of a group.
- 3) Define congruent modulo 'n'.
- 4) Construct Cayley table for $Z_5^\#$.
- 5) Determine the right cosets of $\langle [4] \rangle$ in Z_8 .
- 6) In a group G, show that the element a and its inverse a^{-1} have same order.

3. a) Attempt **any two** of the following :

6

- 1) Solve the equation $x(132) = (13)$ in S_3 .
- 2) Prove that every group of prime order is cyclic.
- 3) Compute all subgroups of Z_{18} .

b) Is A set $G = \{1, -1, i, -i\}$ of complete number form a group ?

4



4. Attempt **any two** of the following : **10**

- 1) If there are 10 integers 'x' such that $-25 < x < 25$ and $x \equiv 3 \pmod{5}$ then find all such x.
- 2) If the element of a group G is of order n then prove that $a^m = e$ iff n is divisor of m.
- 3) Prove that $\langle Z_n, \odot \rangle$ is a commutative group.

5. Attempt **any one** of the following : **10**

- 1) State and prove Cayley theorem.
 - 2) a) If G and G' be two groups and $f : G \rightarrow G'$ is a homomorphism then prove that Kerf is normal subgroup of G.

b) Show that the function $f : (R, +) \rightarrow (R^+, \cdot)$. Given by $f(x) = e^x$ is an isomorphism of group.
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B.Sc. – II (Semester – IV) Examination, 2015
BOTANY (Paper – VIII) (New)
Plant Diversity and Utilization

Day and Date : Friday, 15-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) **All questions are compulsory.**
2) Draw **neat** and labelled diagram **wherever necessary.**
3) Figures to the **right** indicate **full marks.**

1. Rewrite the following sentences by choosing correct answer from the given alternatives :

10

- 1) In *Sargassum*, conceptacles are present on
 - a) main axis
 - b) primary branch
 - c) receptacles
 - d) secondary branch
- 2) _____ of *Puccinia* is binucleate.
 - a) Uredospor
 - b) Teleutospore
 - c) Pycnidiospore
 - d) Aecodiospore
- 3) In *Anthoceros*, sporophyte is _____ shaped.
 - a) whip
 - b) ribbon
 - c) horn
 - d) none of these
- 4) *Pinus* leaves are _____ shaped.
 - a) needle
 - b) ribbon
 - c) oval
 - d) round
- 5) *Equisetum* is the only living genus that belongs to
 - a) Sphenopsida
 - b) Caphalida
 - c) Chlorophycophyta
 - d) Pteropsida
- 6) Lucern is a
 - a) Grass
 - b) Food legume
 - c) Fodder legume
 - d) None of these
- 7) Botanical name of ginger is
 - a) *Tinospora cordifolia*
 - b) *Rauwolfia serpentina*
 - c) *Aloe vera*
 - d) *Zingiber officinale*

P.T.O.



Seat No.	
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B.Sc. (Part – II) (Semester – IV) Examination, 2015
GEOGRAPHY
Biogeography – II (New) (Paper – VII)

Day and Date : Saturday, 16-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Draw neat diagrams wherever necessary.**
3) **Use of stencils is allowed.**
4) **Figures to the right indicate full marks.**

1. Choose the correct alternative and complete the following sentences : **10**
- 1) The geological history of the earth is divided into _____ era.
a) 3 b) 5 c) 7 d) 9
 - 2) _____ has given a classification of floral regions based on climatic conditions.
a) New bigin b) Darlington
c) Wallace d) Tansley
 - 3) When the living organisms leave their place of origin it is called as _____
a) migration b) dispersal
c) movement d) shifting
 - 4) Migration is a process in which the organism _____ to its place of origin.
a) returns b) leaves c) shifts d) settle
 - 5) Merino is an important sheep for _____
a) skin b) hides c) wool d) meat
 - 6) Paper pulp industry is based on _____ forests.
a) conifers b) equatorial
c) grass lands d) semi arid
 - 7) Atmospheric _____ due to human activities is responsible for environmental degradation.
a) pollution b) gases c) vapour d) dust
 - 8) Use of toxic chemicals for crops' protection disturbs the _____
a) air b) water c) soil d) environment



9) Conservation, recycling, renewability and population control all are included in _____ development.

- a) sustainable b) short term c) under d) unsupportable

10) Forest fire is considered as an _____ hazard.

- a) ecological b) environmental c) anthropogenic d) biotic

2. Answer **any five** of the following : **10**

- 1) What is 'Cambrian' ?
- 2) What is dispersal ?
- 3) Name of the forest products of temperate grasslands.
- 4) Give the name of commercial fishing grounds of Atlantic ocean.
- 5) Name the countries important for livestock farming.
- 6) What is "legal protection" to the environment ?

3. A) Answer **any two** questions from the following : **6**

- 1) Describe the types of organic resources.
- 2) State the types of migration.
- 3) Describe the life evolution in Precambrian era.

B) State the causes of dispersal. **4**

4. Answer **any two** questions from the following : **10**

- 1) What are the causes of water pollution ?
- 2) Describe the methods of conservation of bioresources.
- 3) State the Darwin's theory of evolution of life.

5. Answer **any two** questions from the following : **10**

- 1) What are the effects of air pollution ?
 - 2) State the need of legal protection to forests.
 - 3) Write in brief the environmental hazards.
-



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B.Sc. II (Semester – IV) (New) Examination, 2015
PSYCHOLOGY Paper – VII
COGNITIVE PSYCHOLOGY

Day and Date : Saturday, 16-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions : i) **All questions are compulsory.**
ii) **Figure to the right indicate full mark.**

1. Multiple choice.

10

- 1) The generalized kinds of knowledge about situations and events are called
 - a) Pattern
 - b) Schemas
 - c) Template
 - d) All
- 2) The encoding specificity phenomenon was proposed by
 - a) Tulring
 - b) Bartlet
 - c) Miller
 - d) Fruid
- 3) _____ is memory for events from one's own life.
 - a) Semantic
 - b) Episodic
 - c) Autobiographical
 - d) Flash bulb
- 4) _____ is the model of semantic memory.
 - a) Working memory
 - b) Network model
 - c) Act model
 - d) Flash model
- 5) _____ involves constructing on internal representation.
 - a) Grasping
 - b) Understanding
 - c) Problem solving
 - d) Any other
- 6) _____ refers to assessing and choosing among general alternatives.
 - a) decision making
 - b) creativity
 - c) any other
 - d) thinking

P.T.O.



- 7) Short cuts in problem solving are called
- a) Algorithms
 - b) Heuristic
 - c) Divergent thinking
 - d) Automatic
- 8) _____ is the most common measure of explicit memory.
- a) Recall
 - b) Recognition
 - c) Reconstruction
 - d) Thinking
- 9) Problem with common structure are
- a) Different
 - b) Analogous
 - c) Equal
 - d) Add
- 10) General problems solver was developed by
- a) Newell and Simon
 - b) Anderson
 - c) Glass
 - d) Holyok

2. Write short answer of the following (**any four**).

8

- 1) What is the full form of LTM ?
- 2) What is means by flashbulb memory ?
- 3) Define creativity.
- 4) What is mean by Meta memory ?
- 5) Define script ?
- 6) Write the four main factor which influence problem solving.

3. Write short notes (**any four**).

12

- 1) Flashbulb Memories.
- 2) Expertise
- 3) Mood
- 4) Eyewitness Testimony
- 5) External Memory Aids
- 6) Mnemonies Using Imagery.



4. Answer **any one** long type questions of the following. **10**

A) Explain the concept of schemas in brief.

OR

B) Explain the means Ends Heuristic and analogy approach of problem solving.

5. Long answer. **10**

1) Explain the measures and influencing factors of creativity.



Seat No.	
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B.Sc. – II (Semester – IV) (New) Examination, 2015
ELECTRONICS (Paper – VII)
Fundamentals of Operational Amplifier

Day and Date : Saturday, 16-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :**
- 1) **All questions are compulsory.**
 - 2) Draw **neat diagrams wherever necessary.**
 - 3) Figures to the **right** indicate **full marks.**
 - 4) **Use of log-table and calculator is allowed.**

1. Select the correct alternative from the following : **10**
- i) The main advantage of differential amplifier is that, it rejects
 - a) common mode signal
 - b) distortion
 - c) differential mode signal
 - d) noise
 - ii) In differential amplifier $A_d = 1000$ and $A_c = 0.1$, then CMRR is
 - a) 100
 - b) 1000
 - c) 10000
 - d) 1000.1
 - iii) The parameter which decides the speed of op.-amp. is
 - a) CMRR
 - b) PSRR
 - c) slew rate
 - d) UGB
 - iv) The input impedance of an inverting amplifier is approximately equal to
 - a) R_i
 - b) zero
 - c) infinity
 - d) R_f
 - v) Current to voltage converter is also called as
 - a) transresistance amplifier
 - b) log amplifier
 - c) transconductance amplifier
 - d) none of these
 - vi) A voltage follower has a
 - a) high input impedance
 - b) low output impedance
 - c) voltage gain of one
 - d) all of the above



- vii) An op.-amp. comparator that uses positive feedback is known as a
- a) zero crossing detector
 - b) schmitt trigger
 - c) differentiator
 - d) voltage follower
- viii) The peak value of the input to a precision half-wave rectifier is 10V. The approximate peak value of the output is
- a) 10V
 - b) 10.7V
 - c) 9.3V
 - d) 5V
- ix) In phase shift oscillator op.-amp. is used in
- a) differential mode
 - b) voltage follower mode
 - c) non-inverting mode
 - d) inverting mode
- x) As the feedback resistor value R is increased, frequency of astable multivibrator
- a) increases
 - b) decreases
 - c) remains same
 - d) none of these

2. Answer **any five** of the following :

10

- i) What is a differential amplifier ?
- ii) Define differential mode gain and common mode gain.
- iii) Draw the block diagram of operational amplifier.
- iv) What do you mean by summing amplifier ?
- v) Write the applications of the comparator.
- vi) Draw the circuit diagram of triangular wave generator with the help of op.-amp.

3. A) Answer **any two** of the following :

6

- i) Why the inputs of operational amplifier are called inverting and non inverting ?
- ii) Explain the following parameters of op.-amp. :
 - a) input offset voltage
 - b) input bias current
 - c) input offset current
- iii) State linear and non linear applications of op.-amp.

B) What is slew rate ? If a slew rate of an op.-amp. is $20 \text{ v}/\mu\text{s}$, calculate the maximum undistorted peak output voltage, we can obtain at 1MHz.

4



4. Answer **any two** of the following : **10**

- i) Explain the wienbridge oscillator using op.-amp. in detail.
- ii) Explain the working of regenerative comparator by using op.-amp.
- iii) What is op.-amp. ? Draw and explain equivalent circuit of op.-amp.

5. Answer **any one** of the following : **10**

- i) Explain op.-amp. as monostable multivibrator and obtain expression for pulse width.
 - ii) Write notes on voltage to current converter for floating and grounded loads.
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Seat No.	
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B.Sc. (Part – II) (Semester – IV) Examination, 2015
GEOLOGY (Paper – VII) (New)
Igneous Petrology

Day and Date : Saturday, 16-5-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Draw neat diagrams wherever necessary.**
3) **Figures to the right indicates full marks.**

1. Fill in the blanks with suitable answer from the given options :

- 1) The proof for eutectic crystallization can be seen in the _____ texture.
a) Clastic b) Graphic c) Granitic d) Flow banding
- 2) Granitic texture is found in _____ rock.
a) Granite b) Gabbro c) Basalt d) Dolerite
- 3) Ophitic texture is developed in _____
a) Granite b) Pumice c) Dolerite d) Dunite
- 4) As per Bowen's reaction series, the last mineral to form is _____
a) Quartz b) Olivine c) Mica d) Plagioclase
- 5) Magmatic differentiation by the separation of liquid phases of different compositions is known as _____
a) Gravitational sinking b) Volatile constituent
c) Liquid immiscibility d) None of these
- 6) The constant proportion of two components crystallize simultaneously at a common point, that point is called as _____ point.
a) Eutectic b) Clastic c) Boiling d) Freezing
- 7) Gabbro is _____ rock.
a) Sedimentary b) Volcanic c) Hypabyssal d) Plutonic
- 8) Quartzite is formed by _____ metamorphism.
a) Thermal b) Dynamothermal
c) Cataclastic d) Clastic



9) Solidification under low pressure conditions take place to form _____ rocks.

- a) Hypabyssal b) Plutonic c) Volcanic d) Intermediate

10) Flow structure is identical in _____

- a) Rhyolite b) Basalt c) Granite d) Graphic Granite

2. Answer **any five** of the following :

- 1) Trachytic texture
- 2) Formation of granite
- 3) Graphic texture
- 4) Salic minerals
- 5) Expansion cracks
- 6) Poikilitic texture.

3. A) Answer **any two** of the following :

- 1) Xenolith formation
- 2) Eutectic
- 3) Granularity.

B) Reaction Rim.

4. Answer **any two** of the following :

- 1) Describe unicomponent crystallization.
- 2) Classify the igneous rocks on the basis of mode of occurrence.
- 3) Describe liquid immiscibility and gravity types of differentiations.

5. Answer **any two** of the following :

- 1) Describe the formation processes of glass and crystals; give two example rocks of each.
 - 2) Describe the granularity aspect of texture with proper examples.
 - 3) Describe the Porphyritic texture with example.
-



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B.Sc. II (Semester – IV) (New) Examination, 2015
MICROBIOLOGY (Paper – VII)
Immunology and Medical Microbiology

Day and Date : Saturday, 16-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :*** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw labelled diagram wherever necessary.**

1. Rewrite the following sentences by choosing correct answer. 10
- i) _____ is used as clinical sample for respiratory tract infections.
- a) Blood b) Stool
c) Urine d) Sputum
- ii) _____ is present in milk of mother.
- a) IgG b) IgA
c) IgM d) IgE
- iii) Acid fast staining is used for microscopic diagnosis of
- a) Tuberculosis b) Dysentery
c) Malaria d) Anaemia
- iv) _____ are used for passive immunization.
- a) Antigens b) Vaccines
c) Antisera d) Antibiotics
- v) When cellular antigens reacts with antibody, shows _____ type reaction.
- a) Agglutination b) Precipitation
c) Flocculation d) Immunodiffusion.

P.T.O.



vi) Haptens are incomplete

- a) Antibody
- b) Antisera
- c) Antigen
- d) Antibiotic

vii) Clonal selection theory of antibody production was putforth by

- a) Pasteur
- b) Burnet
- c) Lister
- d) Jenner

viii) Widal Test is used for diagnosis of _____ fever.

- a) Enteric
- b) Malarial
- c) Dengue
- d) Scarlet

ix) _____ is secondary lymphoid organ.

- a) Bone marrow
- b) Lymph node
- c) Bursa
- d) Thymus

x) _____ produces coagulase enzyme.

- a) E.Coli
- b) Salmonella
- c) Shigella
- d) S. aureus

2. Answer **any five** of the following.

10

- i) Define passive immunity.
- ii) List the causative agents of enteric fever.
- iii) Define clinical sample.
- iv) List the normal flora of urinary tract.
- v) What is serum ?
- vi) Give the significance of complement fixation test.

3. A) Write **any two** of the following.

6

- i) Bacterial Toxins
- ii) Symptoms of Dengue fever.
- iii) Role of phagocytic cells in immunity.

B) With diagram describe IgG antibody.

4



4. Write **any two** of the following. **10**

- i) Describe the factors affecting antigenicity.
- ii) Describe in brief second line of defense.
- iii) Describe in brief staphylococcal wound infections.

5. Write **any two** of the following. **10**

- i) Give the mechanism of Ag-Ab reactions and describe agglutination test.
 - ii) Describe urinary tract infections.
 - iii) Describe biochemical methods for identification of pathogens.
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Seat No.	
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B.Sc. II Semester – IV (New) Examination, 2015
GEOGRAPHY
Agricultural Geography – II Paper No. (VIII)

Day and Date : Monday, 18-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **All questions carry equal marks.**
3) **Draw neat diagram wherever necessary.**
4) **Use of Stencil is allowed.**

1. Choose the correct alternative and rewrite it. 10
- 1) _____ is believed to be an area of origin of agriculture.
(S. E. Asia, N. America, Taiga, Steppes)
 - 2) The seasonal migration of people with their live stock from mountain slopes to valleys is known as _____
(trans humance, pastoralism, nomadism, ranching)
 - 3) _____ industry produces a by-product called molasses.
(textile, sugar, furniture, chemical)
 - 4) _____ is believed to have experience farming firstly.
(Russia, S. E. Asia, Middle East, America)
 - 5) Plantation agriculture is mainly practiced in _____ areas.
(temperate, tropical, equatorial, polar)
 - 6) The phenomenal growth in agricultural production has been called as _____
(green revolution, evolution, white revolution, blue revolution)
 - 7) Regur soils are best suitable for agriculture due to their _____
(colour, PH, porocity, moisture retentivity)
 - 8) Large number of sheep are present in _____
(Turkey, Myanmar, Pakistan, Kazakstan)



- 9) Shifting cultivation is called as _____ in Madhya Pradesh.
(Onam, Bera, Zoom, Poda)
- 10) PH value of a soil is related with its _____
(fertility, salinity, texture, colour)
2. Write short answer (**any five**). **10**
- 1) Name any two cashcrops of India.
 - 2) Name any two the countries with extensive agricultural practices.
 - 3) State any two problems of Indian agriculture.
 - 4) What is organic fertilizer ?
 - 5) What is green revolution ?
 - 6) Name the countries famous for dairy farming.
3. A) Write answer (**any two**). **6**
- 1) What are the effects of chemical fertilizers ?
 - 2) Explain the importance of allied areas in agriculture.
 - 3) Describe the role of agriculture in economy of a country.
- B) Write a note on problems of Indian agriculture. **4**
4. Write answer in short (**any two**). **10**
- 1) State the importance of climate in agriculture.
 - 2) Discuss the importance of irrigation techniques in agriculture.
 - 3) State the salient features of mixed farming.
5. Write brief answer (**any two**) **10**
- 1) Describe the significance of study of agriculture geography.
 - 2) What are the types of agriculture explain any one of them.
 - 3) Write in brief the sheep and goat rearing.
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Seat No.	
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B.Sc. – II (Semester – IV) (New) Examination, 2015
PSYCHOLOGY
Positive Psychology (Paper – VIII)

Day and Date : Monday, 18-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N. B. : 1) **All questions are compulsory.**
2) **Figures to *right* indicate *full* marks.**

1. Choose the correct alternative : 10
- 1) _____ is a factors of psychological well being.
A) Personal growth B) Happiness
C) Self D) Satisfaction
 - 2) Happiness is a factors of _____ well being.
A) Emotional B) Physical C) Mental D) Educational
 - 3) There are two tradition of _____
A) Happiness B) Self C) Autonomy D) Life
 - 4) _____ assessed by the levels of satisfaction in different life domains.
A) Life satisfaction B) Well being
C) Happiness D) Self
 - 5) _____ and her colleagues have developed a model of psychological well being.
A) Ruff B) Ryan C) Waterman D) Seligman
 - 6) Waterman describes _____ psychological views of happiness.
A) 2 B) 6 C) 8 D) 10
 - 7) There are _____ components of subjective well being.
A) 3 B) 6 C) 9 D) 12
 - 8) _____ description of the two pillars of positive psychology.
A) Seligman's B) Skinner's C) Maslow's D) Adler's
 - 9) Self determination theory depend on _____ basic psychological needs.
A) three B) two C) four D) six
 - 10) _____ is a factors of social well being.
A) Social acceptance B) Happiness
C) Self D) All



2. Answer the following **(any four)** : **8**
- 1) What is the meaning of meaningful life ?
 - 2) What is the meaning of pleasant life ?
 - 3) Define positive psychology.
 - 4) Define happiness.
 - 5) How many types of well being ?
 - 6) State the three components of SWB.
3. Write short notes **(any four)** : **12**
- 1) Factors of social well being.
 - 2) Health psychology.
 - 3) Life satisfaction.
 - 4) Factors of psychological well being.
 - 5) Positive and negative affect.
4. A) Explain two tradition of happiness. **10**
- OR
- B) Explain psychological resources.
5. Describe psychology of well being. **10**
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Seat No.	
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B.Sc. (Part – I) (Semester – I) (Old) Examination, 2015
CHEMISTRY (Paper – II)
Inorganic Chemistry

Day and Date : Tuesday, 7-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat and labelled diagrams wherever necessary.**
3) Figures to the **right** indicate **full marks.**
4) **Use of logarithmic tables and scientific calculator is allowed.**

1. Choose the most correct alternative for **each** of the following : **10**

- 1) In an atom each electron is characterised by _____ quantum numbers.
a) zero b) three c) four d) two
- 2) The general electronic configuration of IV A group elements is _____
a) ns^2 b) $ns^2 np^2$ c) $ns^2 np^1$ d) $ns^2 np^3$
- 3) The ionization potential of different orbitals is in the order of _____
a) $f > d > p > s$ b) $f < d < p < s$
c) $s > p > f > d$ d) $s > d > p > f$
- 4) In NH_3 molecule, expected bond angle is _____
a) $109^\circ 28'$ b) $107^\circ 35'$ c) 109° d) $104^\circ 27'$
- 5) For directional characteristics of covalent bond, Heitler-London Theory was extended by _____
a) Pauling b) Slater
c) Pauling and Slater d) Bethe
- 6) $P_x - P_x$ overlap gives _____ bonding MO.
a) σP_x b) $\sigma^* P_x$ c) πP_x d) $\pi^* P_x$
- 7) Which of the following molecules have bond order three ?
a) C_2 and O_2 b) N_2 and CO c) N_2 and O_2 d) CO and NO

P.T.O.



- 8) _____ bond is non-directional.
a) Ionic b) Covalent c) Co-ordinate d) Dative
- 9) The crystal structure of NaCl is _____
a) BCC b) FCC c) Trigonal d) Hexagonal
- 10) K_2S is isomorphic with _____
a) CaO b) Na_2S c) $CaCl_2$ d) $MgCl_2$

2. Answer **any five** of the following : **10**
- 1) Define the terms atomic and ionic radius.
 - 2) State and explain Aufbau principle.
 - 3) What is hybridization ? Give its different types.
 - 4) Draw MO diagram for H_2 molecule.
 - 5) Define the terms unit cell and lattice energy.
 - 6) $NaCl_2$ is called as an imaginary molecule. Why ?
3. A) Answer **any two** of the following : **6**
- 1) Discuss the M.P. and B.P. of s and p block elements.
 - 2) Distinguish between atomic orbitals and molecular orbitals.
 - 3) On the basis of VBT, explain the formation of $BeCl_2$ molecule.
- B) Discuss the importance of Born-Haber cycle. **4**
4. Answer **any two** of the following : **10**
- 1) How the reactivity of s and p block elements depends upon the periodic properties ?
 - 2) Explain the formation of SF_6 molecule on the basis of VBT.
 - 3) With the help of MO diagram explain the formation of O_2 molecule.
5. Answer **any two** of the following : **10**
- 1) Discuss deviation in geometry of ClF_3 molecule.
 - 2) With the help of MO diagram, comment upon bond order, stability and magnetic character of NO molecule.
 - 3) Discuss the characteristics of ionic solids.
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Seat No.	
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B.Sc. – II (Semester – IV) (New) Examination, 2015
ELECTRONICS (Paper – VIII)
Digital Techniques and Microprocessor

Day and Date : Monday, 18-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** labelled diagram **wherever** necessary.
3) Figures to the **right** indicate **full** marks.
4) Use of log table and calculator is **allowed**.

1. Select the correct alternative for the following : **10**
- i) If “P” is the number of address lines required to access “m” number of memory locations, then the relationship between p and m is
- a) $p = m$ b) $2 \times p = m$
c) $2^p = m$ d) $2^m = p$
- ii) The memory chip IC 2764 is a
- a) SRAM b) EEPROM
c) DRAM d) UVEPROM
- iii) Comparator, D to A converter and programmer are the important blocks of _____ method.
- a) Binary weighted
b) R-2R ladder
c) Successive approximation
d) Dual slope



- iv) If analog input voltage range of an 8-bit A to D converter is 0 to +5V, its step size will be approximately
- a) 19.5 mV b) 4.8 mV
c) 39.0 mV d) 1.2 mV
- v) Which one of these ICs is used for address decoding ?
- a) 74244 b) 74245
c) 74373 d) 74138
- vi) IC 74244 is used as a unidirectional buffer for
- a) Address bus b) Data bus
c) Control bus d) Both a) and b)
- vii) In memory-mapped-I/o technique for μp 8085, the memory has _____ address and I/O device has _____ address.
- a) 16-bit and 8-bit b) 8-bit and 16-bit
c) 8-bit and 8-bit d) 16-bit and 16-bit
- viii) In the pin-out of μp 8085, the number of pins used for address bus are
- a) 8 b) 16 c) 20 d) 24
- ix) If data 05 H is logically AND with another data 57 H, the result would be
- a) 05 H b) 57 H c) 50 H d) 75 H
- x) Which one of these is a register addressing data transfer instruction ?
- a) MVI C, 06 H b) MOV A, D
c) IN 50 H d) LDAX B

2. Answer **any five (two marks each)** :

10

- i) Give the basic difference between static memory and dynamic memory.
- ii) Explain in brief, any two specifications for D to A converter.
- iii) What is the role of ALE signal ?
- iv) Explain the basic difference between PAL and PLA.
- v) Enlist the flags available in μp 8085.
- vi) Discuss any one conditional jump instruction.



3. A) Answer **any two** from the following (**three marks each**) : **6**
- i) Draw the diagram of memory cell and explain in brief.
 - ii) Explain the concept of CPLD.
 - iii) Draw the pin diagram of ADC 0804.
- B) Explain how data bus and address bus is demultiplexed in μ p 8085. **4**
4. Answer **any two** of the following (**five marks each**) : **10**
- i) Discuss the architecture of RAM memory IC 6264.
 - ii) Draw the logic diagram of IC 74245 and explain.
 - iii) Explain the salient features of μ p 8085.
5. Answer **any one** : **10**
- i) Explain the functional block diagram of μ p 8085.
 - ii) Discuss different addressing modes available in μ p 8085 with suitable instructions.
Write a program to add two data values 05 H and 07 H stored in memory locations 2050 H and 2060 H. Save the result at 2080 H.
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Seat No.	
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B.Sc. (Part – II) (Semester – IV) Examination, 2015
GEOLOGY (Paper – VIII) (New)
Sedimentary and Metamorphic Petrology

Day and Date : Monday, 18-5-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

1. Fill in the blanks with correct answer from the given options : **10**

- 1) Metamorphic effects are greatest adjacent to _____ rocks.
a) Sedimentary b) Metamorphic c) Extrusive d) Intrusive
- 2) Partial replacement of garnet by irregular rims of chlorite indicates _____
a) Migmatitisation b) Retrograde metamorphism
c) Anataxis d) Granitisation
- 3) Darker bands in Migmatites are of _____ origin.
a) Metamorphic b) Igneous c) Marine d) Sedimentary
- 4) The most heterogenic rock is _____
a) Conglomerate b) Breccia
c) Grit d) Arkose
- 5) Volcanic breccias is known as _____
a) Agglomerate b) Lava Breccia
c) Crush Breccia d) Fault Breccia
- 6) Black shales indicate _____ environment of deposition.
a) Oxygen rich b) Reducing c) Glacial d) Desert
- 7) Sand size of clastic sediments is between _____ mm.
a) 0.1 - 2 b) 0.1 - 3 c) 0.002 - 0.2 d) 0.002 - 0.02



- 8) Most common clay mineral in shale is _____
a) Illite b) Chlorite c) Kaolinite d) Quartz
- 9) _____ are well developed minerals in metamorphic rocks that are larger than average grain size.
a) Granoblast b) Poikiloblast c) Porphyroblast d) Xenoblast)
- 10) Alternate dark and light mineral bands are present in _____
a) Mica schist b) Granite gneiss
c) Greenshist d) Amphibolite

2. Explain **any five** of the following : 10
- 1) Bauxite
 - 2) Shape of sediments
 - 3) Migmatites
 - 4) Marble
 - 5) Dolomite
 - 6) Amphibolite.
3. A) Describe **any two** of the following : 10
- 1) Retrograde metamorphism
 - 2) Eclogite facies
 - 3) Breccia and its origin.
- B) Explain mineral composition and texture-structure of Shale.
4. Explain **any two** of the following : 10
- 1) Fabrics of metamorphic rocks
 - 2) Polymetamorphism
 - 3) Pneumatolysis.
5. Describe **any two** of the following : 10
- 1) Arenaceous deposits.
 - 2) Marine environments of deposition.
 - 3) What are minerals in sedimentary rocks ?
-



Seat No.	
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B.Sc. – II (Semester – IV) (New) Examination, 2015
MICROBIOLOGY (Paper – VIII)
Applied Microbiology – II

Day and Date : Monday, 18-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat, labelled diagrams wherever necessary.**

1. Rewrite the following sentences by choosing correct answer. 10

- 1) A type of beverage produced as a result of microbial fermentation is _____
a) beer b) butanol c) acetic acid d) acetone
- 2) _____ is an example of secondary metabolite.
a) amino acid b) alcohol c) antibiotic d) CO₂ gas
- 3) The vessel used for commercial fermentation product is known as _____
a) reactor b) furnace c) rotor d) fermentor
- 4) The size and number of impeller blades depend upon _____ of fermentor.
a) cost b) material c) purpose d) size
- 5) _____ are used to control foam formation.
a) antifoam agents b) sparger c) baffles d) coils
- 6) The crowded plate technique is suitable for screening of _____ producers.
a) acid b) growth factors c) antibiotic d) vitamin
- 7) _____ assay procedure determines the effect of test compound on metabolic reactions
a) diffusion b) turbidimetric
c) enzymatic d) metabolic response
- 8) The small scale fermentor is useful for _____ purpose.
a) optimization b) recovery c) production d) research



9) The value that is occurring most frequently in the data is called _____

- a) mean b) mode c) median d) range

10) The most suitable pH for formation of penicillin is _____

- a) 6.5 b) 7.5 c) 7.0 d) 5.0

2. Answer in short (**any five**) :

10

- a) Define fermentation.
- b) What is surface culture method ?
- c) Describe single stage fermentation process.
- d) Define probiotics.
- e) Write on size of fermentor vessels.
- f) Write on fermentation conditions of penicillin production.
- g) What is mean ?

3. A) Answer **any two** of the following :

6

- i) Write on scope of industrial microbiology.
- ii) Give an account of multiple fermentation.
- iii) Write on SCP production.

B) Write on applications of biostatistics.

4

4. Write on **any two** of the following :

10

- i) Give an account of basic concepts of fermentation process.
- ii) Give an account of primary screening.
- iii) Describe alcohol fermentation.

5. Write on **any two** of the following :

10

- i) Give an account of continuous fermentation.
 - ii) Describe methods of preservation of industrially important organisms.
 - iii) Describe assay procedures.
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Seat No.	
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B.Sc. – II (Sem. – IV) (Old) Examination, 2015
CHEMISTRY (Paper – VII)
Physical Chemistry

Day and Date : Thursday, 7-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** diagram and give equation **wherever** necessary.
3) Figures to the **right** indicate **full** marks.
4) **Use** of logarithmic tables and scientific calculator is **allowed**.
(At. wts. : H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

1. Choose the most correct alternative and rewrite the sentence : 10
- 1) The specific conductance of solution on dilution
 - a) Increases
 - b) Decreases
 - c) Remains constant
 - d) First increases then decreases
 - 2) p^H of 10^{-4} M solution of NaOH would be
 - a) 8
 - b) 10
 - c) 2
 - d) 4
 - 3) In aqueous solution, strong electrolytes ionize
 - a) Almost completely
 - b) About 50%
 - c) Incompletely
 - d) About 20%
 - 4) ΔS° represents the value of
 - a) Standard entropy change
 - b) Standard enthalpy change
 - c) Standard free energy change
 - d) None of these
 - 5) (111) plane of cubic crystal is known as
 - a) Diagonal plane
 - b) Cubic plane
 - c) Cubic diagonal plane
 - d) None of these
 - 6) NaCl crystal exhibits _____ elements of symmetry.
 - a) 32
 - b) 23
 - c) 53
 - d) 16
 - 7) If the crystal presents same appearance when it is rotated through 120° then the axis is called
 - a) Two fold axis
 - b) Three fold axis
 - c) Four fold axis
 - d) One fold axis



- 8) The value of refractive index depends on
 a) Volume b) Pressure c) Temperature d) All of these
- 9) Para-dichlorobenzene has _____ dipole moment.
 a) Zero b) Two c) Four d) None of these
- 10) The unit of dipole moment is
 a) Calories b) Joules c) Faradays d) Debye

2. Answer **any five** of the following : 10

- i) What is absolute ionic mobility of an ion ? Give the relation between it and ionic conductivity.
- ii) What are strong and weak electrolytes ?
- iii) What is transport number of an ion ? Give the equation which shows its relation with speed of an ion.
- iv) State whether ΔS is positive or negative in the following processes.
- a) $\text{Br}_2(\text{g}) \rightarrow \text{Br}_2(\text{l})$ b) $\text{MgCO}_3(\text{s}) \rightarrow \text{MgO}(\text{s}) + \text{CO}_2(\text{g})$
- v) What are the advantages of Abbe's refractometer ?
- vi) What is crystallography ? Name the laws of crystallography.

3. A) Answer **any two** of the following : 6

- i) State Kohlrausch law. How it is applicable to determine the degree of dissociation ?
- ii) A crystal plane intercepts the three crystallographic axes at the multiples of unit distances $\frac{3}{2}$, 2 and 1. What will be the Miller indices of the plane ?
- iii) What are polar and non-polar molecules ? Write suitable examples.
- B) Define conductance. The λ_{∞} values for NH_4Cl , NaOH and NaCl at 298 K are 149.74, 248 and 126.85 $\text{ohm}^{-1} \cdot \text{cm}^2 \text{equi}^{-1}$ respectively, calculate the λ_{∞} of NH_4OH . 4

4. Answer **any two** of the following : 10

- i) Define buffer solution. What are the properties of the buffer solution ?
- ii) Define entropy. Calculate the entropy change involved in thermodynamic expansion of 2 moles of a gas from a volume of 4 dm^3 to a volume of 40 dm^3 at 300 K. ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$).
- iii) Write a note on electrical polarization of molecules.

5. Answer **any two** of the following : 10

- i) What are electronic and electrolytic conductors ? Explain the mechanism of conduction of electric current through electrolytic conductor.
- ii) Derive an expression for entropy change of an ideal gas associated with change in volume at constant temperature.
- iii) Give a full account on structure of sodium chloride.
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Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
COMPUTER SCIENCE (Paper – VII) (Old)
Data Structures

Day and Date : Thursday, 7-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

Instructions: 1) **All questions are compulsory.**
2) **Figures to the right place indicate full marks.**

1. Choose correct alternatives : 10
- 1) Terminal node in tree has only one child.
a) True b) False
 - 2) Queue is primitive data type.
a) True b) False
 - 3) _____ is the postfix expression of infix expression $x * (y - z)$
a) $xyz*-$ b) $xy* z-$ c) $xyz -*$ d) $xy - z*$
 - 4) Inserting new node in between two nodes of doubly linked list requires _____ pointer to exchange.
a) One b) Two c) Three d) Four
 - 5) Merge sort uses _____ strategy.
a) Divide and conquer b) Back tracking
c) Greedy d) Heuristic
 - 6) _____ search begins from the first array element.
a) Parallel b) Random c) Sequential d) Binary
 - 7) Attempting to push element in full stack gives _____ condition.
a) Overflow b) Underflow c) Empty d) None of these
 - 8) In case of ascending priority queue _____ element is processed firstly.
a) Largest b) Smallest c) Medium d) None of these



Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
CHEMISTRY (Paper – VIII) (Old)
Analytical and Industrial Inorganic Chemistry

Day and Date : Friday, 8-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) Draw **neat** diagram and give equations **wherever** necessary.
3) Figures to **right** indicate **full** marks.

1. Select the correct alternative for the following and rewrite the sentences. **10**
- I) Aluminon is used to precipitate
a) Ni b) Cu c) Fe d) Al
- II) _____ is nothing but process of digestion.
a) Ageing b) Nucleation c) Coagulation d) Ignition
- III) _____ process removes all ions from water.
a) soda ash b) ion exchange c) zeolite d) limesoda
- IV) Eriochrome black - T is _____ indicator.
a) Acid-base b) Metallochromic
c) Neutralisation d) None of these
- V) Sedimentation is a _____ process.
a) Biological b) Settling
c) Coagulation d) Chemical
- VI) _____ increase the efficiency of catalyst.
a) Reactant b) Product
c) Temperature d) Promotes
- VII) The process of heating steel to bright redness and then cooling suddenly is known as
a) Annealing b) Case-hardening
c) Tempering d) Hardening



- VIII) Due to increase in temperature _____ pollution resulted.
a) inorganic b) physical c) chemical d) thermal
- IX) Contact process was developed by
a) Philips b) Haber c) Ostwald d) Solvay
- X) The water that gives good leather on treatment with soap is called
a) Soft water b) Hard water
c) Permanent hard water d) Temporary hard water

2. Answer **any five** of the following : **10**
- I) Define the term indicator.
 - II) Explain classification of catalysis.
 - III) Name two methods of purification of water.
 - IV) Explain the term crystal growth.
 - V) Write two advantages of organic precipitant.
 - VI) Give merits of L.D. process.
3. A) Answer **any two** of the following : **6**
- I) Name the different types of steel.
 - II) Write note on Quinoid theory of indicator.
 - III) Explain the characteristics of catalytic reaction.
- B) Draw and explain manufacture of sulphuric acid by contact process. **4**
4. Answer **any two** of the following : **10**
- I) What is steel and explain manufacture of steel by Bessemer process ?
 - II) Explain the types of EDTA titration.
 - III) Explain the role of organic precipitant 8-hydroxy quinoline in gravimetric analysis.
5. Answer **any two** of the following : **10**
- I) Define water pollution and explain the types of water pollution.
 - II) Explain intermediate compound theory of catalysis.
 - III) Explain neutralisation curve for titration between strong acid Vs strong base.
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B.Sc. – II (Semester – IV) Examination, 2015
COMPUTER SCIENCE
System Analysis and Design (Paper – VIII) (Old)

Day and Date : Friday, 8-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions : 1) Figures to the **right** indicates **full** marks.
2) **All** questions are **compulsory**.

1. Choose the correct alternatives : 10

1) _____ feasibility considers the cost/benefit analysis of the system.

- a) Technical b) Operational c) Economical d) None of these

2) _____ symbols is used data flow.

a) →
←

b)

c)

d)

3) DFD stands for

- a) Data Fare Diagram b) Data Fact Diagram
c) Data Flow Diagram d) None of these

4) A decision table contains

- a) condition b) action c) action entry d) none of these

5) Open system does not interacts with environment.

- a) True b) False

6) A graphical representation is called

- a) program b) flowchart c) algorithm d) all of above

7) Case tools support different activities in software process classified in two ways

- a) Activity and function oriented b) Planning and quality assurance
c) Project control and planning d) All of the above



- 8) _____ testing focuses on functional requirement of the software.
a) Black box b) Gray box c) White box d) Boundary
- 9) _____ is a data structure in which all non key data elements are fully functionally dependent on primary keys.
a) 1NF b) 2NF c) 3NF d) 4NF
- 10) I level DFD contains single process.
a) True b) False

2. Solve **any five** of the following : **10**
- 1) Define system and subsystem.
 - 2) Define normalization.
 - 3) Draw a symbols of DFD.
 - 4) Define decision tree and decision table.
 - 5) Define ERD.
 - 6) What is meant by Software ?
3. a) Solve **any two** of the following : **6**
- 1) What are the symbols used to write the system flowchart ?
 - 2) State the role of system analyst.
 - 3) What is system analysis and why ?
- b) Draw CLD and first level DFD for college admission. **4**
4. Solve **any two** of the following : **10**
- 1) Prepare the questionnaire for library system.
 - 2) Draw decision tree to find maximum among three nos.
 - 3) Explain the term 'need of normalization'.
5. Solve **any two** of the following : **10**
- 1) Explain system maintenance, system analysis in SDLC.
 - 2) Write a note on 'black box testing'.
 - 3) Write a note on 'fact finding technique'.
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Seat No.	
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B.Sc – II (Semester – IV) Examination, 2015
PHYSICS (Paper – VII) (Old)
Electronics

Day and Date : Saturday, 9-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of log table or calculator is allowed.**
4) **Neat diagrams must be drawn whenever necessary.**

1. Select the correct alternative from the following :

10

- i) The vertical deflection plates in C.R.T. are mounted in the _____ plane.
a) Vertical b) Horizontal c) at 90° d) at 45°
- ii) The part of C.R.T. used to produce a focused beam is
a) Electron gun b) Deflecting system
c) Fluorescent screen d) Phosphor
- iii) When negative feedback is used in amplifier its gain
a) Increase b) Decreases c) Remains same d) Becomes zero
- iv) The condition for obtaining sustained oscillations in the feedback amplifier is given by the relation
a) $A\beta = 1$ b) $A\beta < 1$ c) $A\beta > 1$ d) $A\beta = 0$
- v) In the Colpitt's oscillator the feedback is obtained by
a) Tapping the inductor b) Tapping the condenser
c) RC network d) Tapping the crystal
- vi) NAND gate is called as the universal gate because we can construct from it
a) OR gate only b) AND gate only
c) NOT gate only d) All remaining gates
- vii) UJT can be used as
a) Amplifier b) Oscillator c) Rectifier d) Condenser

P.T.O.



- viii) In the pinch off region of FET
- a) Current is maximum
 - b) Voltage is maximum
 - c) Current is zero
 - d) Voltage is zero
- ix) The D.C. load line on output characteristics of a transistor gives information of output circuit of amplifier is
- a) Zero signal condition
 - b) Maximum signal condition
 - c) Instantaneous signal condition
 - d) Minimum signal condition
- x) In the tank circuit of an oscillator, the energy is stored in the form of _____ energy.
- a) Electromagnetic
 - b) Only electric
 - c) Only magnetic
 - d) Only nuclear

2. Answer **any five** of the following : 10
- i) What do you mean by Barkhausen criterion ?
 - ii) Explain the working of electronic gun in CRT.
 - iii) Give an account of the effect of feedback on frequency response curve of an amplifier.
 - iv) Explain the construction of OR gate using NAND gate.
 - v) What is the function of tank circuit in an oscillator circuit ?
 - vi) Explain the construction of FET.
3. A) Answer **any two** of the following : 6
- i) Explain the working of half adder circuit with truth table.
 - ii) What are the types of waves which can be obtained in oscillators ?
 - iii) Give an account of construction of UJT.
- B) A phase shift oscillator consists of resistances $5\text{ k}\Omega$ and capacitor of $0.1\text{ }\mu\text{F}$ in the feedback circuit. Find the frequency of oscillations. 4
4. Answer **any two** of the following : 10
- i) Explain the construction and working of CRT.
 - ii) Give an account of working of single stage amplifier working in CE mode.
 - iii) State and prove Dc Morgan's theorems.
5. Answer **any one** of the following : 10
- i) Give an account of input, output and transfer characteristics in CE mode of transistor. Derive the relations between α and β .
 - ii) Explain the construction and working of Colpitt's oscillator with neat circuit diagram.
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Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
BIOCHEMISTRY (Old)
Nutrition and Metabolism (Paper – III)

Day and Date : Saturday, 9-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Write biochemical reactions wherever necessary.**

1. Write following reactions by selecting most correct answer from given options : **(10×1=10)**

- i) _____ is a trace element in diet.
a) Sodium b) Phosphorus c) Calcium d) Cobalt
- ii) A healthy adult male has BMR of about _____ C per hr per m² of body surface area.
a) 20 b) 30 c) 40 d) 50
- iii) The inhibitor _____ does not block electron transport from cytochrome aa₃ to molecular oxygen.
a) Hydrogen cyanide b) Hydrogen sulphide
c) Piericidine d) Carbon monoxide
- iv) Oxidation of one pyruvic acid molecule via TCA cycle produces _____ ATP equivalent of energy.
a) 2 b) 15 c) 36 d) 4
- v) Glycogen phosphorylase enzyme is involved in
a) Glycolysis b) Glycogenesis c) Krebs' cycle d) Glycogenolysis
- vi) pH of the blood is precisely regulated at value of
a) 4.5 b) 6.0 c) 7.4 d) 8.2
- vii) Urea is the end product of _____ metabolism.
a) Carbohydrate b) Proteins c) Lipids d) Fatty acids
- viii) _____ hormone increases reabsorption of Na⁺ ions by renal tubules.
a) Aldosterone b) Antidiuretic hormone
c) Thyroxine d) Insulin

P.T.O.



- ix) The Basal Metabolic Rate (BMR) at R.Q. state is _____ calories per hour per meter square of body surface area.
a) 0.70 b) 0.82 c) 1.0 d) 2.0
- x) _____ does not exchange hydrogen during electron transport.
a) FAD b) NAD^+ c) CoQ_{10} d) Cytochromes

2. Answer **any five** from below : **(5×2=10)**

- 1) Why are milk proteins called quality proteins ?
- 2) Which fatty acids are essential in diet ? Why ?
- 3) Write down a reaction for activation of palmitic acid for its β -oxidation.
- 4) What is the source of NADPH required for fatty acid biosynthesis ?
- 5) Which products accumulate in the blood of patients suffering from PKU ?
- 6) Name the four amino acids involved in urea cycle.

3. A) Answer **any two** from below : **(2×3=6)**

- 1) Write and explain decarboxylation reactions of amino acid metabolism.
- 2) How is the excretion and reabsorption of sodium by kidney tubule regulated by hormones ?
- 3) How are the acids produced by body ?

B) Write and explain two reactions of glycolysis those require ATP. **4**

4. Answer **any two** of the following : **(2×5=10)**

- 1) Discuss the reactions of tricarboxylic acid cycle in details.
- 2) What is the role of dietary carbohydrate in body ?
- 3) Explain the general functions performed by ionic substances in the body.

5. Answer **any two** : **(2×5=10)**

- 1) Write and explain the reactions of glycogenesis. What is the purpose of glycogenesis ?
 - 2) How is the basal metabolic rate determined ? Discuss about the factors affecting BMR.
 - 3) Write down respiratory chain and explain the chemoosmotic hypothesis for oxidative phosphorylation.
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Seat No.	
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B.Sc. – I (Semester – I) (Old) Examination, 2015
COMPUTER SCIENCE (Paper – II)
Programming Using C – I

Day and Date : Tuesday, 7-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Each question carry equal marks.**

1. Choose correct alternatives :

10

- 1) Which of the following is a valid variable in C ?
a) ? ctr b) – var ? c) First, name d) abc
- 2) The maximum value that an integer constant can have is _____
a) –32767 b) 32767 c) 1.7014 d) 1.00
- 3) Which of the following is not a control structure statement ?
a) If else b) While for c) Switch d) Do while
- 4) In C language string is _____
a) One dimensional array b) Two dimensional array
c) Multidimensional array d) None of these
- 5) _____ keyword used to jump one statement to another statement.
a) Goto b) Break c) Continue d) All of above
- 6) By default, element of static array initialized to _____
a) 0 b) 1 c) 2 d) 3
- 7) Execution of each C program ends from _____ function.
a) clrscr b) main c) stdio d) getch
- 8) _____ is pictorial representation of algorithm.
a) Algorithm b) Flowchart
c) Program d) None of these

P.T.O.



- 9) Which of the following is an iterative statement ?
- a) While
 - b) Switch
 - c) Goto
 - d) Continue

- 10) 'C' language is developed by _____
- a) Ken Thomson
 - b) Pascal
 - c) Dennis Ritchie
 - d) None of these

2. Solve **any five** of the following : **10**
- 1) State data types in 'C'.
 - 2) Write the syntax of do while statement.
 - 3) Define Array.
 - 4) Define variable and constant.
 - 5) What are the logical operators in 'C' ?
 - 6) What is the purpose of printf () function ?
3. A) Solve **any two** of the following : **6**
- 1) Explain two dimensional array.
 - 2) What are the different string functions used in 'C' language ?
 - 3) Explain the term "Formatted input Function".
- B) Write a program in 'C' to calculate the face value of given number. **4**
4. Solve **any two** of the following : **10**
- 1) Give the brief history of 'C'.
 - 2) Write a program in C to test given number is polindrome or not.
 - 3) Explain nested if.else statement with example.
5. Solve **any two** of the following : **10**
- 1) Explain switch case statement with example.
 - 2) Write a program in C to calculate maximum number among 10 numbers.
 - 3) Explain algorithm and flowchart and draw flowchart for simple interest.
-

Seat
No.

B.Sc. – II (Semester – IV) Examination, 2015
PHYSICS (Paper – VIII) (Old)
Modern Physics

Day and Date : Monday, 11-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :**
- i) **All questions are compulsory.**
 - ii) **Figures to the right indicate full marks.**
 - iii) **Neat diagrams must be drawn wherever necessary.**
 - iv) **Use of log tables and calculators is allowed.**

1. Select correct alternative from the following : 10
- i) The inertial frame of reference is _____ frame of reference.
 - a) an accelerated
 - b) a rotating
 - c) unaccelerated
 - d) oscillating
 - ii) According to Lorentz transformation equations, the length of the rod _____ in the direction of motion.
 - a) remain constant
 - b) decreases
 - c) increases
 - d) none of above
 - iii) The concept of matter waves was proposed by
 - a) Plank
 - b) Rutherford
 - c) Bohr
 - d) De-Broglie
 - iv) Bragg's condition for X-ray diffraction is
 - a) $2d\sin\theta = n\lambda$
 - b) $d\sin\theta = n\lambda$
 - c) $n\sin\theta = \lambda$
 - d) $2d\sin\theta = \lambda$
 - v) In Compton scattering, wavelength of scattered radiation
 - a) increases
 - b) decreases
 - c) remain constant
 - d) becomes half
 - vi) The most common type of coupling is
 - a) JJ
 - b) S-S
 - c) L-J
 - d) LS



- vii) Stern and Garlach experiment confirms
- a) orbital momentum
 - b) space quantisation
 - c) linear momentum
 - d) spin momentum
- viii) The β -particle is identical to
- a) proton
 - b) neutron
 - c) electron
 - d) hydrogen
- ix) The mean life time of radioactive substance is the reciprocal of its
- a) Average life
 - b) Decay constant
 - c) Half life
 - d) None of above
- x) X-rays are discovered by
- a) Rutherford
 - b) Bohr
 - c) Roentgen
 - d) De-Broglie

2. Answer **any five** of the following : 10
- i) Explain the concept of time dilation.
 - ii) Show the graphical representation of the group wave and phase wave.
 - iii) What is Compton effect ?
 - iv) Explain spin quantum number.
 - v) What is Pauli's exclusion principle ?
 - vi) Define half life and average life of radioactive substance.
3. A) Answer **any two** of the following : 6
- i) Define particle velocity, phase velocity and group velocity.
 - ii) Write note on secular equilibrium.
 - iii) Explain L-S coupling.
- B) What is Mosley diagram ? Explain Mosley law. 4
4. Answer **any two** of the following : 10
- i) Describe Stern and Gerlach experiment.
 - ii) Derive Bragg's law of X-ray diffraction.
 - iii) Derive an expression for wavelength of matter waves.
5. Answer **any one** of the following : 10
- i) Describe the Michelson-Morley experiment. How is the negative result interpreted ?
 - ii) Describe an experiment to verify Compton effect.
-

Seat
No.

B.Sc. – II (Semester – IV) Examination, 2015
BIOCHEMISTRY (Old)
Paper – IV : Molecular Biochemistry and Diseases

Day and Date : Monday, 11-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions : 1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Draw labelled diagrams wherever necessary.*

1. Write following sentences by selecting most correct answer from given options.
(10×1=10)
- i) The universal base sequence in all tRNAs at their 3' end is
 - a) – AAA – OH
 - b) – CCC – OH
 - c) – C – C – A – OH
 - d) – G – G – A – OH
 - ii) Many mRNA have poly _____ tail at their 3' end.
 - a) G
 - b) C
 - c) U
 - d) A
 - iii) _____ is not a termination codon in protein synthesis.
 - a) AUG
 - b) UAG
 - c) UGA
 - d) UAA
 - iv) Total genetic information present in a cell is called
 - a) cistron
 - b) operon
 - c) gene
 - d) genome
 - v) _____ genes are subjected to regulation by different mechanisms.
 - a) Constitutive
 - b) Dormant
 - c) Inducible
 - d) Mutated
 - vi) The first restriction map is obtained from _____ using Hin dII enzyme.
 - a) Simian virus 40
 - b) E.Coli
 - c) λ -phage DNA
 - d) Plasmid DNA
 - vii) Azidothymidine (AZT) drug used for AIDS is a _____ drug.
 - a) protein inhibitor
 - b) nucleoside analogue
 - c) membrane transport inhibitor
 - d) c-AMP suppressor



- viii) _____ synthesises and secretes insulin hormone.
- | | |
|--------------------|-------------|
| a) Liver | b) Kidney |
| c) Small intestine | d) Pancreas |
- ix) People working in asbestos mines are at risk to develop cancer of
- | | | | |
|---------|----------|----------|----------|
| a) Skin | b) Liver | c) Bones | d) Lungs |
|---------|----------|----------|----------|
- x) Immunity injected into the immune deficient person is _____ immunity.
- | | |
|--------------------|-----------------------|
| a) Natural active | b) Artificial active |
| c) Natural passive | d) Artificial passive |

2. Answer **any five** : **(5×2=10)**

- 1) Differentiate between DNA and RNA (any four).
- 2) What is the role of interferon in innate immunity ?
- 3) What is body's response to HIV infection during early acute phase ?
- 4) What is function of cyclic AMP bound catabolite gene activator protein (c-AMP-CAP) in the transcription of lac operon ?
- 5) What are the causes of occurrence of non-insulin dependent diabetes ?
- 6) Write down the structural formula of a nucleotide.

3. A) Answer **any two** : **(2×3=6)**

- 1) What is natural active immunity ?
- 2) Discuss initiation of replication.
- 3) State any three applications of genetic engineering.

B) Draw a labelled diagram of pBR 322 plasmid, showing its different sites. **4**

4. Attempt **any two** : **(2×5=10)**

- 1) Explain in brief the mechanism of transcription.
- 2) Discuss-primary and secondary immune response.
- 3) Write down the cause of cancer.

5. Answer **any two** : **(2×5=10)**

- 1) Describe the structure of HIV.
 - 2) Explain the gene cloning technique for insulin production.
 - 3) Write down the general features of genetic code.
-



Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
STATISTICS (Paper – VII) (Old)
Continuous Probability Distributions – II

Day and Date : Tuesday, 12-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

Instructions : 1) **All** questions are **compulsory** and carry **equal** marks.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :

10

1) If X and Y are independent gamma variates, then X/Y has

- | | |
|------------------------|------------------------|
| a) $\beta_1(n_1, n_2)$ | b) $\beta_2(n_1, n_2)$ |
| c) $F(n_1, n_2)$ | d) None of these |

2) The mode of Beta (3, 4) of first kind is

- | | |
|------------------|------------------|
| a) $\frac{2}{5}$ | b) $\frac{3}{7}$ |
| c) $\frac{4}{7}$ | d) None of these |

3) If $X \sim \beta_2(m, n)$ variate, then $\frac{1}{X}$ follows

- | | |
|--------------------|------------------|
| a) $\beta_1(m, n)$ | b) $G(m, n)$ |
| c) $\beta_2(n, m)$ | d) None of these |

4) Points of inflexion of normal probability curve are

- | | |
|--|--|
| a) $\mu - \sigma$ and $\mu + \sigma$ | b) $\mu - 2\sigma$ and $\mu + 2\sigma$ |
| c) $\mu - 3\sigma$ and $\mu + 3\sigma$ | d) None of these |

5) Let $X \sim N(\mu, \sigma^2)$, then the central moments of odd order are

- | | |
|-------------|------------------|
| a) One | b) Zero |
| c) Infinite | d) None of these |



3. A) Attempt **any two** of the following : 6

- i) State and prove additive property of chi-square distribution.
- ii) Obtain the harmonic mean of β_1 (m, n) distribution.
- iii) Find the m.g.f. of $G(\alpha, \lambda)$ distribution.

B) Show that, even order central moments of $N(\mu, \sigma^2)$ are given by

$$\mu_{2r} = 1.3.5 \dots (2r - 1) \sigma^{2r} \quad 4$$

4. Attempt **any two** of the following : 10

- i) Find mean and variance of beta distribution of first kind with parameters (m, n).
- ii) If X and Y are independent Chi-square variates with m and n d.f. respectively.

Obtain the distribution of $U = X + Y, V = \frac{X}{X + Y}$.

- iii) If $F \sim F(n_1, n_2)$ variate, then show that the distribution of n, F tends to Chi-square distribution with n, d.f, as $n_2 \rightarrow \infty$.

5. Attempt **any two** of the following : 10

- i) Define p.d.f. of gamma distribution with parameters (α, λ) and find its mean and variance.
 - ii) Find the variance of t-distribution with n d.f.
 - iii) Obtain mode of χ^2 - distribution with n d.f.
-



Seat No.	
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**B.Sc. (Part – II) (Sem. – IV) Examination, 2015
ZOOLOGY (Paper – VII) (Old)
Animal Diversity – IV**

Day and Date : Tuesday, 12-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.

1. Rewrite the following sentences using correct alternatives : **10**
- 1) Presence of hairy coat is character of
a) Birds b) Amphibians c) Mammals d) Reptiles
 - 2) In dog _____ teeth are large, strong and pointed for tearing the flesh.
a) Incisors b) Canines c) Premolars d) Mollars
 - 3) Pulmonary vein carry _____ blood.
a) Oxygenated b) Deoxygenated
c) Mixed d) Clotted
 - 4) The Mesozoic era is called as the
a) Golden era of reptiles b) Golden era of birds
c) Golden era of mammals d) Golden era of fishes
 - 5) Gastric digestion takes place in
a) Stomach b) Rectum c) Oesophagus d) Large intestine
 - 6) Bile is _____ in nature.
a) Acidic b) Alkaline c) Neutral d) Strongly acidic
 - 7) _____ cells are phagocytic in function.
a) Leucocytes b) Thrombocytes
c) Erythrocytes d) Platelet



- 8) In poisonous snakes teeth are termed as
- a) Tusk
 - b) Molars
 - c) Fangs
 - d) Milk teeth
- 9) Seed eating beak is found in
- a) Parrot
 - b) Sparrow
 - c) Duck
 - d) Vulture
- 10) Heart of rat is _____ chambered.
- a) One
 - b) Two
 - c) Three
 - d) Four

2. Write short notes on (**any five**) : **10**
- 1) Salient features of birds.
 - 2) Raptorial type of legs.
 - 3) Functions of liver of rat.
 - 4) Snake venom.
 - 5) Dentition in human.
 - 6) Gastric digestion.
3. A) Attempt **any two** : **6**
- 1) Functions of brain of rat.
 - 2) Give the features of marsupials.
 - 3) Mesozoic reptiles.
- B) Poison apparatus of snake. **4**
4. Answer **any two** of the following : **10**
- 1) Describe the process of ultrafiltration in rat.
 - 2) Give the characters of archaeopteryx.
 - 3) Describe the structure of eye of rat.
5. Answer **any one** of the following : **10**
- 1) Describe arterial system of rat.
 - 2) Describe in detail migration of birds.
-



Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
STATISTICS (Paper – VIII) (Old)
Applied Statistics

Day and Date : Wednesday, 13-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory and carry equal marks.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative. 10

i) The number of possible samples of size 'n' out of 'N' population units without replacement is

- a) $N C_n$ b) N^n c) n^2 d) $n!$

ii) Probability of drawing a unit at each section remains same in

- a) srswor b) srswr
c) both (a) and (b) d) none of (a) and (b)

iii) A selection procedure of a sample having no involvement of probability is known as

- a) purposive sampling b) judgement sampling
c) subjective sampling d) all the above

iv) Chance variation in respect of quality control of a product is

- a) tolerable
b) not effecting the quality of a product
c) uncontrollable
d) all the above

v) The faults due to assignable causes

- a) can be removed b) cannot be removed
c) can sometimes be removed d) all the above



- vi) Vital statistics mainly concerned with
 a) births b) deaths c) marriages d) all the above
- vii) A hypothesis may be classified as
 a) simple b) composite c) null d) all of these
- viii) The degrees of freedom for the paired 't' test statistic based on 'n' pairs of observations is
 a) $2n - 1$ b) $n - 1$ c) $2(n - 1)$ d) none of these
- ix) Student's t test is applicable for _____ samples.
 a) small b) large c) any size d) none of these
- x) To test for independence of attributes which of the following tests is used
 a) Normal b) t c) χ^2 d) F

2. Answer **any five** of the following :

10

- i) Distinguish between a statistic and a parameter.
- ii) Define level of significance and critical region.
- iii) Explain with illustration 'sample'.
- iv) Explain the term fraction defective.
- v) What is product control ?
- vi) Explain what is a composite hypothesis. Give an example.

3. A) Answer **any two** of the following :

6

- i) Explain fully one and two tailed tests.
- ii) Explain between Total Fertility Rate (TFR) and Gross Reproduction Rate (GRR).
- iii) Show that in SRSWOR the probability of selecting a specified unit of the population at any given draw is equal to the probability of selecting it at the first draw.

B) Answer the following :

4

For the 2×2 contingency table, prove that the chisquare test for independence gives

$$\chi^2 = \frac{N(ad - bc)^2}{(a + c)(a + b)(c + d)(b + d)}$$

where $N = a + b + c + d$



4. Answer **any two** of the following : **10**

- i) Explain the meaning and purpose of Statistical Quality Control (SQC).
- ii) Describe the indirect method of obtaining STDR.

iii) With usual notations, prove that $V(\bar{y}_n) = \left(\frac{N-n}{Nn}\right) S^2$.

5. Answer **any two** of the following : **10**

- i) Describe the test procedure to test for the population proportion $p = p_0$ based on a large sample.
 - ii) Explain the construction of \bar{X} chart in production process when standards are given.
 - iii) Distinguish between chance causes and assignable causes of variation.
-



Seat No.	
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B.Sc. – I (Semester – I) Examination, 2015
PHYSICS (Paper – I) (Old)
Mechanics and Properties of Matter

Day and Date : Wednesday, 8-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B.:** I) **All questions are compulsory.**
II) **Figures to right indicate full marks.**
III) **Draw neat diagrams wherever necessary.**
IV) **Use of logarithmic table and calculator is allowed.**

1. Select the correct alternative from the following : 10

I) Moment of inertia of rectangular lamina about an axis through its centre and parallel to one of its side is _____

a) $I = M \left(\frac{l^3}{3} + \frac{b^2}{12} \right)$

b) $I = \frac{M(l^2 + b^2)}{12}$

c) $I = \frac{Mb^2}{3}$

d) $I = \frac{Mb^2}{12}$

II) A spherical shell of mass 500 gm has diameter 15 cm, the moment of inertia about its diameter is _____

a) 18750 kg.m²

b) 20200 gm.cm²

c) 42188 gm. cm²

d) 18750 gm. cm²

III) The angular acceleration of compound pendulum is directly proportional to its _____

a) Linear displacement

b) Mass

c) Angular displacement

d) Force

IV) The modulus of rigidity of material of the wire can be determined by using _____ pendulum.

a) Simple

b) Torsion

c) Bifilar

d) Kater's



- V) Compression strain is equivalent to _____
- | | |
|--------------------|-------------------------|
| a) Shear | b) Half of shear |
| c) Double of shear | d) Square root of shear |
- VI) The Poisson's ratio of iron is _____ when $\gamma = 22 \times 10^{10} \text{ N/m}^2$ and $\eta = 8 \times 10^{10} \text{ N/m}^2$
- | | | | |
|----------|---------|--------|------|
| a) 0.375 | b) 0.35 | c) 0.5 | d) 1 |
|----------|---------|--------|------|
- VII) The surface tension of liquid _____ with increase in its temperature.
- | | |
|---------------------|------------------|
| a) Decreases | b) Increases |
| c) Remains constant | d) None of these |
- VIII) The excess pressure in soap bubble is _____
- | | |
|-----------------------|-----------------------|
| a) $P = \frac{2T}{r}$ | b) $P = \frac{2r}{T}$ |
| c) $P = \frac{4T}{r}$ | d) $P = \frac{4r}{T}$ |
- IX) In atomiser, the fall in pressure occurs due to _____
- | | |
|-------------------------|----------------------------|
| a) Increase in velocity | b) Decrease in velocity |
| c) Increase in pressure | d) Decrease in temperature |
- X) Dimensions of coefficient of viscosity are _____
- | | |
|------------------------|------------------------|
| a) $[M^0L^1T^{-1}]$ | b) $[M^1T^1L^{-1}]$ |
| c) $[M^{-1}L^1T^{-1}]$ | d) $[M^1L^{-1}T^{-1}]$ |

2. Answer **any five** of the following :

10

- I) Define moment of inertia.
- II) What is torsional pendulum ?
- III) Define Poisson's ratio.
- IV) Define surface tension and give its SI unit.
- V) State factors affecting on viscosity.
- VI) Calculate the difference of pressure between the two sides of the surface of a spherical drop of water of radius 0.5 mm. surface tension of water is 0.075 N/m.



3. A) Answer **any two** of the following : **6**
- I) Write experimental technique of Poisson's ratio of rubber.
 - II) Deduce the time period of compound pendulum.
 - III) Calculate the moment of inertia of a rectangular lamina about an axis passing through mid point of breadth and perpendicular to its plane. Given length = 15 cm, Breadth = 12 cm, Mass = 100 gm.
- B) Explain Bernoulli's theorem. **4**
4. Answer **any two** of the following : **10**
- I) Deduce the relation between surface tension, excess pressure and radius of curvature.
 - II) Derive moment of inertia of flywheel.
 - III) For Kater's pendulum, the distance between knife edges is 1m. The time taken for 50 oscillations of the pendulum are 100.25 sec. and 100.30 sec. resp. about the two knife edges. Find value of g.
5. Answer **any one** of the following : **10**
- I) Derive relation between elastic constants.
 - II) Derive Poiseuille's formula for flow of liquid through capillary tube.
-



- 8) Father of immunology was
a) Louis Pasteur b) John Mendel c) James Watson d) Edward Jenner
- 9) Duration of menstrual cycle in woman is _____ days.
a) 25 b) 05 c) 27 d) 28
- 10) Colostrum is secreted by breast contains
a) Milk with Vit. b) Milk with sugar
c) Milk with salt d) Milk without fat

2. Answer **any five** of the following : **10**
- i) Graffian follicle
 - ii) Role of Kupffer's cells
 - iii) Sketch and label the structure of Malpighian body
 - iv) Sketch and label the structure of antibody
 - v) Foam tablets
 - vi) Lymph nodes.
3. A) Answer **any two** of the following : **6**
- i) With suitable diagram describe the histology of mammalian stomach.
 - ii) Describe the hormones of neurohypophysis.
 - iii) Draw neat labelled diagram of T. S. of spinal cord.
- B) Describe the estrogen. **4**
4. Answer **any two** of the following : **10**
- i) Describe the hormonal control of lactation.
 - ii) With suitable diagram describe the structure, function of striated muscle.
 - iii) Describe the oestrous cycle in rat.
5. Answer **any one** of the following : **10**
- i) Describe the histological structure of mammalian ovary.
 - ii) What is contraception ? Describe the intra-uterine devices used for the contraception.
-



Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
MATHEMATICS (Paper – VII) (Old)
Integral Calculus

Day and Date : Thursday, 14-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for each of the following :

10

1) If $\beta(m, n) = \int_0^1 x^{m-1} (1-x)^{n-1} dx$ then values of m and n are

a) $m > 0, n < 0$

b) $m < 0, n > 0$

c) $m > 0, n > 0$

d) $m < 0, n < 0$

2) $\int_0^{\infty} x^3 e^{-x} dx =$

a) 3

b) 5

c) 6

d) 4

3) $\sqrt{\frac{1}{2}} =$

a) $\sqrt{\frac{\pi}{2}}$

b) $\frac{\pi}{2}$

c) $\sqrt{\pi}$

d) π

4) $\frac{\beta(m+1, n)}{\beta(m, n+1)} =$

a) $\frac{n}{m}$

b) $\frac{m}{n}$

c) $\frac{m+1}{n+1}$

d) $\frac{n+1}{m+1}$

P.T.O.



5) If $z = f(x, y)$ then volume with suitable limits are known is

a) $\iiint z dx dy dz$

b) $\iint z dx dy$

c) $\int z dz$

d) none of these

6) $\iint_A f(x, y) dx dy =$

a) $\iint_A f(r \cos \theta, r \sin \theta) d\theta dr$

b) $\iint_A f(r \cos \theta, r \sin \theta) r d\theta dr$

c) $\iint_A f(r \sin \theta, r \cos \theta) d\theta dr$

d) $\iint_A f(r \sin \theta, r \cos \theta) r d\theta dr$

7) $\int_0^\pi \int_0^{a\theta} r^3 dr d\theta =$

a) $\frac{a^4 \pi^5}{20}$

b) $\frac{a^4 \pi^5}{4}$

c) $\frac{a^4 \pi^5}{5}$

d) $\frac{a^4 \pi^4}{20}$

8) Rectification is the process of evaluating _____ plane curve.

a) length of arc of

b) area under

c) volume revolving by

d) surface area of

9) The length of the curve $r = f(\theta)$ between two points whose vectorial angles are a and b is

a) $\int_a^b \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta$

b) $\int_a^b \sqrt{r^2 + \left(\frac{d\theta}{dr}\right)^2} d\theta$

c) $\int_a^b \sqrt{\theta^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta$

d) $\int_a^b \sqrt{\theta^2 + \left(\frac{d\theta}{dr}\right)^2} d\theta$

10) Find the volume of solid generated by rotating completely about x-axis the area enclosed between $y = \sqrt{x^3 + 5x}$ and the lines $x = 2$ and $x = 4$ is

a) 60π

b) 70π

c) 80π

d) 90π



2. Attempt **any five** of the following : 10

1) Evaluate $\int_1^{\log 8} \int_0^{\log y} e^{x+y} dx dy$.

2) Evaluate $\int_0^{\frac{\pi}{2}} \int_0^a r^n \sin^n \theta \cos \theta dr d\theta$, $n + 1 > 0$.

3) Prove that $\beta(p, q) = \beta(q, p)$.

4) Show that $\beta(m, n) = \beta(m, n+1) + \beta(m+1, n)$.

5) Find the length of the arc of the catenary $y = a \cosh \frac{x}{c}$ measured from the vertex $(0, a)$ to any point (x, y) .

6) Obtain the volume of the sphere of radius a .

3. A) Attempt **any two** of the following : 6

1) Evaluate $\iint x^2 y^2 dx dy$ over the region $x^2 + y^2 \leq 1$.

2) Show that area of a loop of the curve $x^4 = a^2(x^2 - y^2)$ is $\frac{2a^2}{3}$.

3) Prove that $\Gamma(m) \Gamma\left(m + \frac{1}{2}\right) = \frac{\sqrt{\pi}}{2^{2m-1}} \Gamma(2m)$.

B) Show that the length of the curve $x^2 = a^2(1 - e^{y/a})$ measured from $(0, 0)$ to

(x, y) is $a \log \left(\frac{a+x}{a-x} \right) - x$. 4

4. Attempt **any two** of the following : 10

1) Change the order of integration $\int_0^{2a} \int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} f(x, y) dx dy$.

2) Evaluate $\int_0^2 x^4 (8 - x^3)^{-1/3} dx$.

3) Find the volume of the solid obtained by revolving the one arc of the cycloid $x = a(\theta + \sin \theta)$, $y = a(1 + \cos \theta)$.



5. Attempt **any two** of the following :

10

1) Given that $x + y = u$, $y = uv$ change the variables x, y to u, v in the integrand

$\iint \sqrt{xy(1-x-y)} \, dx \, dy$ taken over the area enclosed by the lines $x = 0$, $y = 0$,

$x + y = 1$. Show that the value of the integral is $\frac{2\pi}{105}$.

2) Prove that the area of the region bounded by the curve $a^4y^2 = x^5(2a - x)$ is to that of the circle whose radius is 5 to 4.

3) Prove that $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^4}} \cdot \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$.



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B.Sc. (Part – II) (Sem. – IV) (Old) Examination, 2015
BOTANY (Paper – VII)
Plant Physiology

Day and Date : Thursday, 14-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :**
- i) **All questions are compulsory.**
 - ii) Draw **neat** labelled diagrams **wherever** necessary.
 - iii) Figures to the **right** indicate **full** marks.

I. Write the correct answer :

10

- 1) Glycolysis occurs in
 - a) Mitochondrion
 - b) Peroxisome
 - c) Chloroplast
 - d) Cytosol
- 2) _____ discovered auxins.
 - a) Charles Darwin
 - b) Kurosawa
 - c) Yabuta – Sumuki
 - d) Miller and Skoog
- 3) Nitrogenase enzyme is not present in
 - a) Nostoc
 - b) Anabena
 - c) Rhizobium
 - d) Aspergillus
- 4) Reaction centre of photosystem I is
 - a) P₆₆₀
 - b) P₆₈₀
 - c) P₆₉₀
 - d) P₇₀₀
- 5) TCA cycle is also known as
 - a) EMP pathway
 - b) Krebs cycle
 - c) C₃ cycle
 - d) C₄ cycle
- 6) _____ is the richest source of Gibberellins in higher plants.
 - a) Roots
 - b) Leaves
 - c) Immature seeds
 - d) Stem
- 7) Mineral salts are absorbed by plants as
 - a) cations
 - b) anions
 - c) both a) and b)
 - d) they are

P.T.O.



- 8) Developing grains is the active sink in
a) Maize b) Tomato c) Sugarcane d) Potato
- 9) _____ electrons are required for conversion of molecular nitrogen into ammonia.
a) 6 b) 8 c) 12 d) 18
- 10) Calcium is a chief constituent of
a) Cell wall b) Cell membrane
c) Middle lamella d) Nuclear membrane

II. Answer **any five** of the following : **10**

- i) Sketch the diagram of ultrastructure of mitochondrion.
- ii) Which organisms are involved in biological nitrogen fixation (any four) ?
- iii) What is grand period of growth ?
- iv) Give the role of phosphorus in plants.
- v) Enlist the photosynthetic and accessory pigments in plants.
- vi) Define phloem loading and unloading.

III. A) Answer **any two** of the following : **6**

- i) Give the significance of photosynthesis.
- ii) Explain decarboxylation of pyruvate to Acetyl Co-A.
- iii) Give the applications of ethylene.

B) Explain the cyclic electron transfer in plants. **4**

IV. Answer **any two** of the following : **10**

- i) Describe in brief photoperiodism.
- ii) Write a note on cytokinins.
- iii) Explain the biochemistry of nitrogen fixation in plants.

V. Answer **any two** of the following : **10**

- i) Describe in brief C_4 cycle and give its significance.
 - ii) Explain Mass flow hypothesis.
 - iii) Give an account of assimilate partitioning during vegetative phase.
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Seat No.	
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B.Sc. – II (Semester – IV) Examination, 2015
MATHEMATICS (Paper – VIII) (Old)
Integral Transform

Day and Date : Friday, 15-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose the **correct** alternative for **each** of the following : **10**1) The Laplace transform of $\cosh at$ is

a) $\frac{p}{p^2 - a^2}, p > |a|$

b) $-\frac{p}{p^2 - a^2}, p > |a|$

c) $\frac{a}{p^2 - a^2}, p > |a|$

d) $\frac{a}{p^2 + a^2}, p > |a|$

2) The value of the integral $\int_0^{\infty} e^{-3t} t^5 dt$ is

a) $\frac{1}{243}$

b) $\frac{4}{243}$

c) $\frac{40}{243}$

d) $\frac{80}{243}$

3) If $L\{f(t)\} = \frac{1}{p} e^{-1/p}$, then $L\{f(3t)\}$ is

a) $\frac{1}{3} e^{-3/p}$

b) $\frac{1}{3} e^{-p/3}$

c) $\frac{1}{3p} e^{-3/p}$

d) $\frac{1}{p} e^{-3/p}$

4) The Laplace transform of $\int_0^t e^{au} du$ is

a) $\frac{1}{p(p-a)}$

b) $\frac{1}{p(p+a)}$

c) $\frac{p}{p+a}$

d) $\frac{p}{p-a}$



5) If $F(t)$ be continuous for all $t \geq 0$ and is of exponential order as $t \rightarrow \infty$ and if $F'(t)$ is of class A, then

a) $\lim_{t \rightarrow \infty} F(t) = \lim_{p \rightarrow 0} PL \{F(t)\}$

b) $\lim_{t \rightarrow \infty} F(t) = \lim_{p \rightarrow \infty} PL \{F(t)\}$

c) $\lim_{t \rightarrow 0} F(t) = \lim_{p \rightarrow \infty} PL \{F(t)\}$

d) $\lim_{t \rightarrow 0} F(t) = \lim_{p \rightarrow \infty} f(p)$

6) $L^{-1} \left\{ \frac{1}{(P+2)^2} \right\} =$

a) $e^{-2t}t$

b) e^{-2t}/t

c) te^{2t}

d) None of these

7) $\frac{1}{(P+3)^2}$ is the Laplace transform of

a) t^2

b) t^3

c) e^{-3t}

d) te^{-3t}

8) If $L^{-1} \{f(p)\} = F(t)$ and $F(0) = 0$, then $L^{-1} \{pf(p)\} =$

a) $tF(t)$

b) $F'(t)$

c) $tF'(t)$

d) $F(t)$

9) $L^{-1} \left\{ \frac{1}{p^2 - 6p + 10} \right\} =$

a) $e^{3t} \sin t$

b) $e^{-3t} \sin t$

c) $e^t \sin 3t$

d) $e^{-t} \sin 3t$

10) If $F(t)$ is a function which is sectionally continuous on every finite interval in the range $t \geq 0$ and is of exponential order a as $t \rightarrow \infty$, then the Laplace transform of $F(t)$ exists for all

a) $p = a$

b) $p < a$

c) $p > a$

d) None of these

2. Attempt **any five** of the following :

10

1) Define the term Laplace transform of a function $F(t)$.

2) Find the Laplace transform of $\sin t \cos t$.

3) Evaluate $L \{t^2 e^{2t}\}$.

4) With usual meaning prove that $F * G = G * F$.

5) Find $L^{-1} \left\{ \frac{1}{p^{n+1}} \right\}$ for $n > -1$.

6) Evaluate $L^{-1} \left\{ \frac{1}{\sqrt{2p+3}} \right\}$.



3. A) Attempt **any two** of the following : 6

1) Prove that $L \{tF(t)\} = -f'(P)$ if $L \{F(t)\} = f(P)$.

2) Prove that $L^{-1} \left\{ \frac{e^{-p\pi}}{p^2 + 1} \right\} = -\sin t H(t - \pi)$.

3) Find $L \{e^{-2t} (3\cos 6t - 5\sin 6t)\}$.

B) If $L \{F(t)\} = f(p)$ and 4

$G(t) = \begin{cases} F(t - a) & , t > a \\ 0 & , t < a \end{cases}$ then prove that $L \{G(t)\} = e^{-ap} f(p)$.

4. Attempt **any two** of the following : 10

1) Show that $\int_0^{\infty} \frac{\sin t}{t} dt = \frac{\pi}{2}$

2) If $L \{F(t)\} = f(p)$, then prove that $L \left\{ \frac{F(t)}{t} \right\} = \int_p^{\infty} f(x) dx$ provided $\lim_{t \rightarrow 0} \left\{ \frac{F(t)}{t} \right\}$ exists.

3) Use the convolution theorem to find $L^{-1} \left\{ \frac{P}{(p^2 + a^2)^2} \right\}$.

5. Attempt **any two** of the following : 10

1) If $F(t)$ is a periodic function with period $T > 0$, then prove that

$$L \{F(t)\} = \frac{\int_0^T e^{-pt} \cdot F(t) dt}{1 - e^{-pT}}$$

2) Find $L^{-1} \left\{ \frac{6}{2p - 3} - \frac{3 + 4p}{9p^2 - 16} + \frac{8 - 6p}{16p^2 + 9} \right\}$.

3) Solve $[tD^2 + (1 - 2t)D - 2]y = 0$ if $y(0) = 1, y'(0) = 2$.



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B.Sc. – II (Sem. – IV) Examination, 2015
BOTANY (Paper – VIII) (Old)
Utilization of Plants

Day and Date : Friday, 15-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat and labelled diagrams wherever necessary.**
3) Figures to the **right indicate full marks.**

1. Rewrite the following sentences by choosing correct answer from the given alternatives : 10
- 1) Introduction of plant varieties or species with altered genotypes is considered as
 - a) Selection
 - b) Hybridisation
 - c) Primary introduction
 - d) Secondary introduction
 - 2) Peanut is also called as
 - a) Chick pea
 - b) Walnut
 - c) Groundnut
 - d) Chestnut
 - 3) Lucern is
 - a) Grass
 - b) Food legume
 - c) Fodder legume
 - d) None of these
 - 4) Botanical name of mustard is
 - a) Arachis hypogea
 - b) Brassica juncea
 - c) Cicer arietinum
 - d) Medicago saliva
 - 5) Coir yarn is obtained from the fruits of
 - a) Gossypium arboretum
 - b) Cocus nucifera
 - c) Gossypium hirsutum
 - d) Celosia cristata
 - 6) _____ oil is used in the preparation of perfume, insecticide and mosquito repellent.
 - a) Citronella
 - b) Rose
 - c) Jasmine
 - d) Lowsonia
 - 7) The chief chemical glycoside of sloe is
 - a) Glycirrhisa
 - b) Tinospora
 - c) Vasicine
 - d) Barbaloin



8) Fruit of _____ is one of the components of ayurvedic medicine “Triphala Churna”.

- a) Papaver somniferum b) Adathoda zeylanica
 c) Syzygium aromaticum d) Emblica officinalis

9) Chromatography paper is prepared from _____ fibres.

- a) Hemp b) Cotton c) Jute d) Agave

10) Opuntia is planted as

- a) Flowering plant b) Cactus
 c) Edge plant d) Evergreen plant

2. Answer **any five** of the following :

10

- 1) What is meant by fodder legume ? Give its two examples.
- 2) Give the botanical name, family and source of cotton.
- 3) Write on otto of rose.
- 4) State the botanical name and source of drug of Ashwagandha.
- 5) What are plant insecticides ? Give any two environmental advantages of plant insecticides.
- 6) Give an ornamental value of climbers.

3. A) Answer **any two** of the following :

6

- 1) Centers of origin of cultivated plants.
- 2) Give the economic uses of soybean.
- 3) Explain jasmine as a source of perfumes and cosmetics.

B) Write on clove as a medicinal plant.

4

4. Answer **any two** of the following :

10

- 1) Give the botanical name, source and economic importance of red gram.
- 2) Give a brief account of cultural practices of groundnut.
- 3) Give the botanical name, source and economic importance of Lawsonia.

5. Answer **any two** of the following :

10

- 1) Give a brief account of drugs obtained from aerial stem, state botanical name, chief chemical constituents and medicinal uses.
- 2) Give general account of dyes obtained from different plants. Add a note on their uses.
- 3) What are ornamental plants ? Give the botanical names and ornamental value of cacti and succulents.



Seat No.	
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B.Sc. (Part – II) (Sem. – IV) Examination, 2015
ELECTRONICS (Paper – VII) (Old)
Fundamentals of Operational Amplifier

Day and Date : Saturday, 16-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**
4) **Use of log table and calculator is allowed.**

1. Select the correct alternative for the following : **10**
- i) The input resistance of an ideal Op-amp. is
a) Zero b) Low c) High d) Infinity
- ii) If square wave is applied to Op-amp. integrator then output is _____ wave.
a) Sine b) Cosine c) Triangular d) Saw tooth
- iii) In IC 741, pin no. _____ is the output terminal.
a) 2 b) 3 c) 4 d) 6
- iv) Comparator with positive feedback is called as
a) Schmitt trigger b) Oscillator
c) Zero crossing detector d) None
- v) In Wien bridge oscillator, the RC-network introduces _____ degree phase shift.
a) 0 b) 60 c) 90 d) 180
- vi) Slew rate of Op-amp. must be
a) Zero b) Low c) Moderate d) High
- vii) The voltage gain of voltage follower circuit is
a) Zero b) One c) High d) Infinity
- viii) Op-amp. is a _____ amplifier.
a) RC coupled b) Transformer coupled
c) Direct coupled d) None

P.T.O.



- ix) In precision rectifier, Op-amp. is used to
a) Reduce cut-in voltage b) Increase cut-in voltage
c) Reduce breakdown voltage d) None
- x) A sine wave can be converted into square wave by using
a) Astable mutivibrator b) Schmitt trigger
c) Monostable multivibrator d) None

2. Answer **any five** of the following : **10**
- i) Draw the equivalent circuit diagram of Op-amp.
 - ii) Explain the concept of virtual ground.
 - iii) Draw the circuit diagram of Op-amp. differentiator and write down the expression for output voltage.
 - iv) Define input bias current and input offset current.
 - v) What is the function of sample and hold circuit ?
 - vi) Draw the circuit diagram and output waveform of astable multivibrator using Op-amp.
3. A) Answer **any two** of the following : **6**
- i) What is open loop and closed loop configuration ? Explain the need of closed loop configuration.
 - ii) Draw the circuit diagram of Op-amp. inverting amplifier. In Op-amp. inverting amplifier, $R_i = 1 \text{ K}\Omega$, $R_f = 47 \text{ K}\Omega$ and $V_i = 100 \text{ mV}$. Calculate the output voltage.
 - iii) Explain the working of basic comparator using Op-amp.
- B) Explain phase shift oscillator using Op-amp. **4**
4. Answer **any two** of the following : **10**
- i) Draw the block diagram of Op-amp. and explain the function of each block.
 - ii) Explain Op-amp non-inverting amplifier.
 - iii) Explain half wave rectifier using Op-amp.
5. Answer **any two** of the following : **10**
- i) Explain peak detector using Op-amp.
 - ii) Explain the working of Op-amp. adder circuit.
 - iii) Explain triangular wave generator using Op-amp.
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**B.Sc. (Part – II) (Semester – IV) Examination, 2015
GEOLOGY (Old)
Igneous Petrology (Paper – VII)**

Day and Date : Saturday, 16-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat diagrams wherever necessary.**
3) Figures to the **right indicate full marks.**

1. Fill in the blanks with a suitable answer from the given options : 10
- 1) Volcanic Neck is an intrusion in _____
 - a) Highly folded rock
 - b) Unfolded rock
 - c) Both the above
 - d) None of the above
 - 2) Ophitic texture is developed in _____
 - a) Dunite
 - b) Peridotite
 - c) Gabbro
 - d) Rhyolite
 - 3) Aplite is a _____ type of rock.
 - a) Acidic
 - b) Basic
 - c) Intermediate
 - d) Ultrabasic
 - 4) Which of the following igneous volcanic rock contain highest percentage of silica ?
 - a) Basalt
 - b) Rhyolite
 - c) Trachyte
 - d) Andesite
 - 5) In the Bowen's reaction series _____ is the first and last crystallised minerals.
 - a) Augite-Hypersthene
 - b) Amphibole-Mica
 - c) Olivine-Quartz
 - d) Olivine-Pyroxene



- 6) Labile and metastable zone is observed in _____ magma.
- a) Binary
 - b) Ternary
 - c) Unicomponent
 - d) All the above
- 7) Petrography comprises _____ points.
- a) Chemical and textural
 - b) Mineralogical
 - c) Textural and mineralogical
 - d) All the above
- 8) Siderolite meteorite is composed of
- a) Mixture of Ni-Fe
 - b) Heavy basic silicate
 - c) Stony meteorite
 - d) Mixture of Ni, Fe and Basic silicates
- 9) Dunite contain _____ percentage of silica.
- a) < 76%
 - b) 66 – 54%
 - c) 54 – 45%
 - d) < 45%
- 10) Dolerite is a _____ type of rock.
- a) Plutonic
 - b) Hypabyssal
 - c) Volcanic
 - d) None of the above

2. Explain **any five** of the following :

10

- 1) Amygdaloidal structure.
- 2) Pyrogenetic minerals.
- 3) Graphic texture.
- 4) Spherulitic structure.
- 5) Labile and metastable zone.
- 6) Zoning.



3. A) Answer **any two** of the following : **6**
- I) Concordant igneous rock body.
 - II) Discontinuous reaction series.
 - III) Niggli's classification.
- B) Types of meteorites. **4**
4. Answer **any two** of the following : **10**
- I) Crystallization of Binary magma.
 - II) Describe various structures developed in igneous rocks.
 - III) Describe the process of assimilation of magma.
5. Answer **any two** of the following : **10**
- I) Classification of igneous rocks giving suitable examples.
 - II) Describe the process of differentiation.
 - III) Define texture. Describe any four types of textures of igneous rocks.
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**B.Sc. – II (Sem. – IV) Examination, 2015
MICROBIOLOGY (Paper No. – VII) (Old)
Immunology and Medical Microbiology**

Day and Date : Saturday, 16-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw diagrams wherever necessary.**

1. Choose the correct alternative and write the sentence : **10**
- 1) Coagulase enzyme is produced by
 - a) Streptococcus pneumoniae
 - b) Staphylococcus aureus
 - c) Proteus vulgaris
 - d) Salmonella typhi
 - 2) _____ test is used for diagnosis of enteric fever.
 - a) Germ tube
 - b) Widal
 - c) Coagulase
 - d) Phenyl alanine deamination
 - 3) Platelet count is decreased in _____ infection.
 - a) Candidial
 - b) Dengue fever
 - c) Enteric fever
 - d) Urinary tract
 - 4) _____ immunoglobulin is pentameric.
 - a) IgG
 - b) IgD
 - c) IgM
 - d) IgA
 - 5) First line defense include
 - a) Skin
 - b) Mucus
 - c) Lysozyme secretion
 - d) All of these
 - 6) The example of combined vaccine is
 - a) BCG
 - b) TAB
 - c) Hepatitis B
 - d) Polio
 - 7) The class of immunoglobulin is determined by
 - a) Type of heavy chain
 - b) Type of light chain
 - c) Type of J chain
 - d) Type of antigen



- 8) V.D.R.L. test is an example of _____ reaction.
- a) Agglutination
 - b) Flocculation
 - c) Hemagglutination
 - d) Complement fixation
- 9) _____ is primary lymphoid organ.
- a) Thymus
 - b) Lymph node
 - c) Spleen
 - d) Liver
- 10) Majority of antigens are _____ chemically.
- a) Lipid
 - b) Nucleic acid
 - c) Carbohydrates
 - d) Proteins

2. Answer **any five** of the following : **10**
- i) Explain how skin acts as mechanical barrier for pathogen.
 - ii) What is phagocytosis ? Name phagocytic cells.
 - iii) What is isoantigen ?
 - iv) Write symptoms of enteric fever.
 - v) Write application of ELISA test.
 - vi) Write the function of lymph node.
3. A) Answer **any two** of the following : **6**
- i) What is inflammation ? How it increases immunity ?
 - ii) What is meant by transport media ? Give examples.
 - iii) How do dengue fever is diagnosed ?
- B) What is bacterial toxin ? Write differences between exotoxins and endotoxins. **4**
4. Answer **any two** of the following : **10**
- 1) Write note on complement fixation test.
 - 2) Describe the factors affecting antigenicity.
 - 3) Describe in short structure and function of spleen.
5. Write short notes on (**any 2**) : **10**
- 1) Active immunity
 - 2) Candidiasis
 - 3) General concepts of clinical sample collection.
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Seat No.	
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B.Sc. – I (Semester – I) Examination, 2015
CHEMISTRY (Paper – I) (CGPA Pattern)
Physical and Inorganic Chemistry

Day and Date : Tuesday, 7-4-2015

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- Instructions :**
- All questions are **compulsory**.
 - Draw neat, labelled diagrams **wherever** necessary.
 - Figures to the **right** indicates **full** marks.
 - Use of log table and calculator is allowed.**

SECTION – I
(Physical Chemistry)

1. Select the correct alternative for the following and rewrite the sentences : **5**
- The pressure required to liquify gas at its critical temperature is called as _____
a) Critical volume b) Critical point
c) Critical pressure d) Critical temperature
 - The ideal gas equation for one mole is _____
a) $PV = nRT$ b) $PV = RT$ c) $P = \frac{nRT}{V}$ d) $V = \frac{nRT}{P}$
 - Reaction between $K_2S_2O_8$ and KI is an example of _____ reaction.
a) Second order b) First order c) Third order d) Zero order
 - The term $\frac{d}{dx}$ represents _____
a) Integration b) Derivative c) Calculus d) Finite integral
 - In a cyclic process _____
a) $\Delta E = 0$ b) $W = 0$ c) $\Delta E = +ve$ d) $q = 0$



2. Answer **any five** of the following : **10**
- i) How temperature affects the rate of reaction ?
 - ii) What is Joule-Thomson effect ?
 - iii) Give different forms of straight line equation.
 - iv) Give any four rules of integration.
 - v) Calculate the percentage efficiency of a steam engine operating between 200 k and 100 k.
 - vi) What is non-ideal gas ?
 - vii) Give any two statements of second law of thermodynamics.
3. A) Write short notes on **any two** of the following : **10**
- i) Discuss the Ostwald's isolation method to determine the order of a reaction.
 - ii) What is slope ? Give its characteristics.
 - iii) Derive Van der Waal's equation for one mole of gas.
- B) Answer **any one** of the following : **10**
- i) What is an isotherm ? Explain Andrew's isotherms of CO_2 .
 - ii) Give any two characteristics of first order reaction. For certain first order reaction time for half change equals 100 seconds. How long will it take for the reaction to be 90% completed ?

SECTION – II

(Inorganic Chemistry)

4. Select the most correct alternative for the following and rewrite the sentences : **5**
- 1) All the d-orbitals have equal energy, therefore they are called _____ orbitals.
a) Quantised b) Degenerate c) Symmetrical d) Co-planer
 - 2) The ionic size of an anion is _____ its atom.
a) Greater than b) Equal to c) Smaller than d) None of these



- 3) The geometry of water molecule is _____
a) Linear b) Octahedral c) V-shaped d) Hexagonal
- 4) The principle of MOT is _____
a) Pearson's principle b) Aufbau principle
c) Hybridization d) LCAO approximation
- 5) The limiting radius ratio for cubic geometry is _____
a) 1.00 b) 0.732 – 1.00 c) 0.414 – 0.732 d) 0.225 – 0.414

5. Attempt **any five** of the following : **10**

- i) State Hund's rule of maximum multiplicity.
- ii) Define the terms-electron affinity and electronegativity.
- iii) Give the steps involved in process of hybridization.
- iv) Draw orbital diagram of BeCl_2 molecule.
- v) What is non-bonding molecular orbital ?
- vi) Draw the diagram for $P_x - P_x$ overlap.
- vii) Schematic representation for Born-Haber cycle.

6. A) Write short notes on **any two** of the following : **10**

- i) What is ionization potential ? Explain its trends in a period and in a group in the periodic table ?
- ii) Give the assumptions of Pauling Slater theory of covalent bonding.
- iii) What are type of hybridization ? Explain the formation of BF_3 molecule ?

B) Answer **any one** of the following : **10**

- i) Distinguish between atomic and molecular orbitals. Draw MO diagram for NO molecule. Comment on its stability and magnetic character.
 - ii) What is Hesse's law ? Describe Born-Haber cycle for NaCl and give its importance.
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B.Sc. – I (Semester – I) (Old) Examination, 2015
GEOGRAPHY (Paper – I)
Physical Geography (Geomorphology)

Day and Date : Wednesday, 8-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Draw neat diagrams and maps wherever necessary.**
3) **Use of map stencils is allowed.**
4) **Figures to the right indicate full marks.**

1. Choose the correct alternative :

10

- 1) The term 'Geomorphology' derived from _____ word.
a) Greek b) Spanish c) Marathi d) Arabic
- 2) First order relief features include _____
a) Continents and Ocean basins b) Mountain and Plateaus
c) Plains and Faults d) Valley and folds
- 3) The cigar-shaped matter ejected from the primitive sun is called _____
a) Orbit b) Filament c) Sun d) Star
- 4) The _____ wave do not pass and do not go deeper in the earth.
a) Longitudinal b) Traversal c) Surface d) Primary
- 5) The molten rock material is called _____
a) Soil b) Rock c) Magma d) Liquid
- 6) Downfolded rock beds due to compressive forces caused by horizontal force are called _____
a) Anticline b) Syncline c) Monocline d) Polycline
- 7) The tidal hypothesis proposed by _____
a) James Jeans b) Molten c) Kant d) Russell



- 8) The force coming from within the earth are called _____
- a) Tangential force b) Convergent force
c) Endogenetic force d) Exogenetic force
- 9) The average density of the mantle is _____ gm/cm³.
- a) 4.6 b) 2.8 c) 3.5 d) 5.5
- 10) Igneous rocks are also called as _____
- a) Soft rocks b) Basalts c) Hard rocks d) Parent rocks

2. Answer in short (**any five**) : **10**

- 1) Define the term of Geomorphology.
- 2) Describe the term SIMA.
- 3) What is folding ?
- 4) State the type of earthquakes.
- 5) What is metamorphism ?
- 6) What is volcanoes ?

3. A) Answer in short (**any two**) : **6**

- 1) Describe the types of faults.
- 2) State the causes of earthquakes.
- 3) Describe the formation of igneous rocks.

B) Describe the importance of Geomorphology. **4**

4. Answer the question (**any two**) : **10**

- 1) Describe the chemical composition of the earth's.
- 2) Describe the type of folding.
- 3) Describe the planetesimal theory of the earth origin.

5. Write short answers (**any two**) : **10**

- 1) Write in brief the nature of Geomorphology.
 - 2) Describe the Tidal hypothesis of the earth origin.
 - 3) Describe the classification of rocks.
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Seat No.	
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**B.Sc. – II (Semester – IV) Examination, 2015
ELECTRONICS (Paper – VIII) (Old)
Fundamentals of Microcontroller**

Day and Date : Monday, 18-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) Draw **neat** labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.
4) **Use of calculator is allowed.**

1. Select correct alternative from the following : **10**
- i) _____ company introduced the first 8-bit microcontroller named 8051.
a) Philips b) ATMEL c) INTEL d) Microchip
- ii) The instruction MOV A, RS is an example of _____ addressing mode.
a) immediate b) direct c) register d) indirect
- iii) Number of timers available in μ C 8051 are
a) 1 b) 2 c) 3 d) 0
- iv) Microcontroller is also called
a) embedded system b) system on chip
c) digital signal processing system d) control system
- v) Which one of these features is not present in μ C 8051 ?
a) serial communication port b) interrupts
c) watch dog timer d) parallel port
- vi) Instruction MOV 55 H, 50 H is a _____ instruction.
a) 1-byte b) 2-byte c) 3-byte d) 4-byte
- vii) If data 55 H is ExORed with 66 H, the result will be
a) AA H b) 77 H c) FF H d) 33 H



- viii) Which one of these branching instructions make use of relative addressing method ?
 a) SJMP b) AJMP c) LJMP d) All of these
- ix) If a square wave has equal time delay of one millisecond for T_{ON} and T_{OFF} , the frequency produced will be
 a) 1 KHz b) 500 Hz c) 2 KHz d) 1.5 KHz
- x) The flowchart symbol for decision making is
 a) oval b) rectangle c) diamond d) circle

2. Attempt **any five** : **10**

- i) Give the basic concept of interfacing.
- ii) List any four MCS-51 family members.
- iii) Draw the RESET circuit for $\mu C 8051$.
- iv) List $\mu C 8051$ instructions for multiplication and XOR operation.
- v) How algorithm is different from flowcharting ?
- vi) List the addressing modes of $\mu C 8051$.

3. A) Attempt **any two** : **6**

- i) Discuss in short the bus architecture of microprocessor system.
- ii) Give the comparison between microprocessor and microcontroller.
- iii) Draw the timing diagram for instruction execution of $\mu C 8051$.

B) Give the salient features of $\mu C 8051$. **4**

4. Attempt **any two** : **10**

- i) Draw the general block diagram of 8-bit microprocessor and explain.
- ii) Describe memory organization of $\mu C 8051$.
- iii) Write an ALP to generate square wave. How to change frequency ? Explain.

5. Attempt **any two** : **10**

- i) Draw the block diagram of $\mu C 8051$ and explain.
- ii) What is flowchart ? Explain. Draw the flowchart to add three data bytes.
- iii) Explain the port structure of PORT – 1.



Seat No.	
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B.Sc. (Part – II) (Sem. – IV) (Old) Examination, 2015
GEOLOGY (Paper – VIII)
Sedimentary and Metamorphic Petrology

Day and Date : Monday, 18-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) *All questions are compulsory.*
2) *Draw neat diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*

1. Select the correct answer from the given options : 10
- 1) Rudaceous rocks consisting mainly of _____ sediments.
a) Gravels and Pebbles b) Sand
c) Clay d) Silt
 - 2) The amount of sediment transport in breccia is
a) Higher transportation b) Little or no transportation
c) No relation with transportation d) None of these
 - 3) Grits are _____ sedimentary rocks.
a) Rudaceous b) Residual c) Arenaceous d) Argillaceous
 - 4) Arenaceous sedimentary rocks show _____ texture.
a) Crystalline b) Porphyritic c) Granitic d) Clastic
 - 5) _____ is a clay rock which contains a considerable proportion of carbonates of lime and magnesia.
a) Laterite b) Sandstone c) Marl d) Marble
 - 6) Pyrope garnet and omphacite minerals are characteristic of _____ metamorphic facies.
a) Greenschist b) Amphibolite c) Eclogite d) Granulite
 - 7) _____ is a non-foliated metamorphic rock.
a) Slate b) Marble c) Migmatite d) Phyllite



- 8) _____ has proposed the concept of metamorphic facies.
a) Eskola b) Barrow c) Sederholm d) Miyashiro
- 9) Gneissose structure is a composite structure due to alternation of _____ bands.
a) Hematite and quartzite b) Rock cleavage and granulose
c) Schistose and granulose d) Rock cleavage and schistose
- 10) The term _____ is applied to rocks which have been completely pulverised and rolled out by extreme differential movement during cataclastic metamorphism.
a) Schorl b) Migmatite c) Anatexis d) Mylonite

2. Answer **any five** of the following : **10**
- i) Arkose
 - ii) Shale
 - iii) Marble
 - iv) Granulite
 - v) Migmatite
 - vi) Bauxite.
3. A) Answer **any two** of the following : **6**
- i) Sandstones
 - ii) Greenschist facies
 - iii) Foliated rocks.
- B) Write a note on residual deposits. **4**
4. Answer **any two** of the following : **10**
- i) Metasomatism
 - ii) Calcareous group of rocks
 - iii) Marine environment of deposition.
5. Explain **any two** of the following : **10**
- i) Polymetamorphism.
 - ii) Concept of metamorphic facies and amphibolite facies.
 - iii) Classification of sediments based on grade size.
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Seat No.	
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B.Sc. – II (Sem. – IV) (Old) Examination, 2015
MICROBIOLOGY
Applied Microbiology – II (Paper – VIII)

Day and Date : Monday, 18-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

Rewrite the following sentences by selecting correct answer from the given : **10**

1. 1) The minimum capacity of pilot plant fermentor is _____ litres.
a) 50 b) 100 c) 20 d) 10
- 2) The proper mixing of media constituents in fermentor is achieved by
a) impeller b) baffles c) sparger d) cooling coils
- 3) In the continuous fermentation the microorganism is continuously kept in _____ phase.
a) lag b) stationary
c) early exponential d) logarithmic
- 4) A precursor for penicillin G is supplied from
a) CSL b) Glucose
c) Lactose d) $(\text{NH}_4)_2\text{SO}_4$
- 5) _____ is the optimum sugar concentration for alcohol production.
a) 20% b) 12% c) 10% d) 18%
- 6) The waste generated from dairy industry is
a) molasses b) waste sulphite liquor
c) corn steep liquor d) whey
- 7) In multiple fermentation _____ no. of organisms is used.
a) one b) more than two
c) two d) more than one



- 8) For surface culture method _____ are used as bioreactors.
a) tray
b) flask
c) tubular fermentor
d) fluidised bed reactor
- 9) The Nz free mannitol broth is used for cultivation of _____ organism as biofertiliser.
a) Azolla
b) Azotobacter
c) Rhizobium
d) Azospirillum
- 10) The strain improvement helps in improving _____ of organism.
a) cell size
b) growth rate
c) yield
d) quality of product formation

2. Answer **any five** of the following : **10**
i) Lyophilization
ii) Biofertilizers
iii) Dual fermentation
iv) Define fermentation
v) Molasses as a substrate
vi) Cooling coils.
3. A) Answer **any two** of the following : **6**
i) Recovery of alcohol.
ii) Continuous fermentation.
iii) Strain improvement.
B) Describe primary screening. **4**
4. Solve **any two** of the following : **10**
i) Phosphate solubilising bacteria.
ii) Preservation of industrially important microorganisms.
iii) Penicillin production.
5. Write short notes on (**any two**) : **10**
i) Alcohol fermentation.
ii) Production of biopesticides.
iii) Design of typical fermentor.
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Seat No.	
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B.Sc. Part III (Semester – V) Examination, 2015
ENGLISH (Compulsory)
Countdown English Skills for Success

Day and Date : Wednesday, 1-4-2015

Max. Marks : 50

Time : 3.00 p.m to 5.00 p.m.

Instructions : A) **All questions are compulsory.**

B) Figures to the **right** indicate **full** marks.

1. A) Rewrite the following sentences choosing the correct alternatives given below each :

6

1) Raman's teachers urged him to take the _____ examination.

- a) ICS b) IPS c) IAS d) PSI

2) Bishamber made his money in _____

- a) The village b) Bombay c) Calcutta d) Chennai

3) The poem 'Village Song' is written by _____

- a) Sarojini Naidu b) Rama Naidu
c) Venkayya Naidu d) Sanjay Naidu

4) According to Longfellow, life is _____

- a) meaningless b) transitory
c) an illusion d) real

5) _____ is celebrated as the National Science Day.

- a) 28th February b) 30th March
c) 1st January d) 14th December

6) Tsunami hit Cuddalore on _____

- a) 26th December, 2004 b) 26th November, 2004
c) 26th October, 2004 d) 26th September, 2004



B) Fill in the blanks using appropriate modal verbs :

2

1) You _____ speak English fluently.

- a) can b) may c) might d) will

2) The sky is cloudy and so it _____ rain today.

- a) may b) will c) should d) could

C) Do as directed :

2

1) Mohan said, "I am very happy".

(Change the sentence into indirect speech)

2) He told me that he was o.k.

(Change the sentence into direct speech)

2. Answer the following questions briefly (**any five**) :

10

1) How did Raman spend his spare time ?

2) Why did Raman choose to study musical instruments ?

3) What was the second job in the disaster management at Cuddalore ?

4) How did the servant take Phatik home ?

5) Give a description of Raman's student years.

6) Who were the members of Bishamber's family ?

3. A) Answer **any two** of the following questions :

6

1) What are the things that frighten the speaker of the poem 'Village Song' ?

2) What advice does the poem 'A Psalm of Life' conclude with ?

3) What is the theme of 'Village Song' ?



B) Write reports in brief on **any two** of the following : **4**

- 1) The process of making tea.
- 2) Making a tomato omelette.
- 3) A science experiment.

4. Prepare a presentation script on **any one** of the following using charts / slides. **10**

- 1) Importance of Internet.
- 2) Increasing Population of India.

5. Write a detailed group discussion on the topic 'Credit and Grading System in Examination'. **10**



Seat No.	
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**B.Sc. – III (Sem. – V) Examination, 2015
PHYSICS (Special Paper – IX)
Mathematical and Statistical Physics**

Day and Date : Wednesday, 15-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :**
- 1) **All questions are compulsory.**
 - 2) **Draw diagrams wherever necessary.**
 - 3) **Figures to the right indicate full marks.**
 - 4) **Use of calculators is allowed.**

1. Select the correct alternative :

10

- 1) The priori probability of N balls distributed in K cells of equal size is
 - a) $G = 9^K$
 - b) $G = 9^2$
 - c) $G = 29^N$
 - d) $G = 9^N$
- 2) Phase space is the _____ space.
 - a) one dimensional
 - b) two dimensional
 - c) three dimensional
 - d) six dimensional
- 3) The divergence of a vector field $\nabla \cdot \vec{A}$ is
 - a) a scalar
 - b) a vector
 - c) a constant
 - d) zero
- 4) The scale factor h_2 for cylindrical coordinate system is
 - a) $h_2 = 1$
 - b) $h_2 = r$
 - c) $h_3 = r$
 - d) $h_2 = r$
- 5) The Boltzman partition function is given by
 - a) $Z = \sum g_i e^{-\frac{E_i}{kT}}$
 - b) $Z = \sum g_i e^{-\frac{E_i}{kT}}$
 - c) $Z = \sum g_i e^{-\frac{E_i}{kT}}$
 - d) $Z = \sum g_i e^{-\frac{E_i}{kT}}$



6) Three coordinates of spherical polar coordinate system are

- a) (x, y, z) b) (γ, θ, z) c) (γ, θ, φ) d) (x, θ, φ)

7) Bose Einstein Distribution Law is

a) $n_i = \frac{g_i}{e^{\alpha + \beta u_i}}$ b) $n_i = \frac{g_i}{e^{\alpha + \beta u_i + 1}}$

c) $n_i = \frac{g_i}{e^{\alpha + \beta u_i - 1}}$ d) $n_i = \frac{1}{e^{\alpha + \beta u_i - 1}}$

8) The RMS speed of gas molecule is

a) $\sqrt{\frac{4KT}{m}}$ b) $\sqrt{\frac{3KT}{m}}$

c) $\sqrt{\frac{2KT}{m}}$ d) $\sqrt{KT/m}$

9) The momentum of photons of frequency ν is

a) $h\nu/c$ b) hC/ν

c) $C/h\nu$ d) $h/\nu C$

10) Fermi-Dirac statistics is applicable to the

- a) Molecules b) Photons
c) Boson d) Electron

2. Answer **any five** of the following :

10

- 1) Describe Cartesian coordinate system.
- 2) What is phase space ?
- 3) What are fermions ?
- 4) Define entropy and give thermodynamic functions.
- 5) Define macrostates and microstates.
- 6) What do you mean by distinguishable and indistinguishable particles.



3. A) Answer **any two** of the following : **6**
- 1) Obtain the relation for rms speed for gas molecules.
 - 2) Describe canonical ensemble.
 - 3) Obtain an expression for gradient of a scalar field in orthogonal curvilinear coordinates.
- B) Compare the three M-B, B-E and F-D statistics. **4**
4. Answer **any two** of the following : **10**
- 1) Obtain Laplacian operator in orthogonal curvilinear coordinates.
 - 2) Show that most probable distribution $n_i = N a_i/A$.
 - 3) Derive expression for fermi energy.
5. Answer **any one** of the following : **10**
- 1) State and prove Gauss divergence theorem in vector field.
 - 2) Obtain Wein's Displacement law and Stefan's law from Planck's radiation formula.
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Seat No.	
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B.Sc. III (Semester – V) Examination, 2015
CHEMISTRY
Physical Chemistry (Special Paper – IX)

Day and Date : Wednesday, 15-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Neat diagrams must be drawn whenever necessary.**
4) **Use of logarithmic table/scientific calculator is allowed.**

1. Choose the most correct alternative from **each** of the following and rewrite the sentence :

10

- 1) The reference calomel electrode is made from which of the following ?
a) $ZnCl_2$ b) $CuSO_4$ c) Hg_2Cl_2 d) $HgCl_2$
- 2) In a phase diagram of salt-water system, the eutectic point is known as
a) cryohydric point b) quadrupole point
c) transition point d) both a and b
- 3) Sulphates of calcium, barium and strontium exhibit
a) Chemiluminescence b) Fluorescence
c) Phosphorescence d) None of these
- 4) The chemical reaction : $Cu^{2+} + 2e^- \rightarrow Cu$ is an example of
a) Redox process b) Reversible process
c) Oxidation d) Reduction
- 5) A system containing a mixture of benzene and water at room temperature, the degree of freedom is _____
a) zero b) one c) two d) three



- 6) An expression, $E_c = E_c^\circ - \frac{RT}{nF} \ln Q_a$, is called
- a) Nernst equation b) Van't Hoff equation
 c) Both a and b d) None of these
- 7) The light emitted by firefly is an example of
- a) Fluorescence b) Phosphorescence
 c) Chemiluminescence d) Photosensitisation
- 8) An electrode at which oxidation occurs is called
- a) Cathode b) Anode
 c) Null electrode d) None of these
- 9) Water system has three phases: Ice, water and vapours. The number of components in the system is
- a) Four b) Three c) Two d) One
- 10) A pure metal M in contact with a solution containing M^{n+} ions represents
- a) Metal-metal ion electrode b) Metal-insoluble salt electrode
 c) Redox electrode d) Gas electrode

2. Answer **any five** of the following :

10

- 1) What is metal-insoluble salt electrode ?
- 2) Define the terms degree of freedom.
- 3) State Lambert-Beer's law.
- 4) What is oxygen gas electrode ?
- 5) What do you mean by triple point ?
- 6) What is electrochemical cell ?



3. A) Answer **any two** of the following : 6

- 1) Write a note on liquid-liquid junction potential.
- 2) Explain the reduced phase rule.
- 3) Discuss the application of emf measurement in determination of solubility and solubility product of sparingly soluble salt.

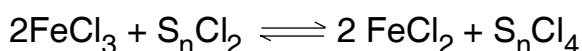
B) A substance absorbs 2×10^6 quanta of radiation per second and 0.002 moles of it react in 20 minutes. Calculate quantum yield of this reaction ($N = 6.023 \times 10^{23}$). 4

4. Answer **any two** of the following : 10

- 1) Derive an equation for emf of chemical cell without transference.
- 2) Discuss in detail, “Jablonski diagram.”
- 3) What is quantum yield ? Give the causes of high and low quantum efficiency of photochemical reactions.

5. Answer **any two** of the following : 10

- 1) Calculate the equilibrium constant of the reaction.



$$(E^\circ_{\text{Fe}^{3+}/\text{Fe}^{2+}} = 0.783\text{V}, E^\circ_{\text{Sn}^{4+}/\text{Sn}^{2+}} = 0.15\text{V})$$

- 2) Draw neatly phase diagram of water system and explain the number of curves involved in it.
 - 3) Derive an expression for emf of an electrolyte concentration cell with transference, which is reversible to cation ?
-



Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
BOTANY (Special Paper – IX)
Biology of Cryptogams

Day and Date : Wednesday, 15-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :**
- 1) **All questions are compulsory.**
 - 2) **All questions carry equal marks.**
 - 3) **Draw neat labelled diagrams wherever necessary.**
 - 4) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by choosing correct alternatives : **(1×10=10)**

- 1) Algae growing on rocks are called as _____
 - a) Lithophytes
 - b) Parasites
 - c) Epiphyte
 - d) Endophyte
- 2) Chantransia stage is formed in the life cycle of _____
 - a) Chara
 - b) Batrachospermum
 - c) Nostoc
 - d) Ectocarpus
- 3) Haplontic type of life cycle of algae is dominated by _____
 - a) Sporophyte
 - b) Tetrasporophyte
 - c) Gametophyte
 - d) Both a) and b)
- 4) Uncinula is an _____ fungus.
 - a) Obligate parasitic
 - b) Facultative parasitic
 - c) Facultative saprophytic
 - d) Obligate saprophytic
- 5) Secondary mycelium is formed in _____
 - a) Polyporus
 - b) Albugo
 - c) Uncinula
 - d) Aspergillus



3. A) Answer **any two** of the following : **(2×3=6)**
- I) Describe the parenchymatous forms of algae.
 - II) Describe the nutrition in Albugo.
 - III) Explain reduction theory of sporophyte in Bryophytes.
- B) Give economic importance of mushrooms. **4**
4. Answer **any two** of the following : **(2×5=10)**
- I) Asexual reproduction in Albugo.
 - II) Haplontic life cycle in algae.
 - III) Describe female sex organ of Batrachospermum.
5. Answer **any two** of the following : **(2×5=10)**
- I) Describe sporocarp of Marsilea.
 - II) Describe the external morphology of Marchantia.
 - III) Give economic importance of Polyporus.
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Seat No.	
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B.Sc. (Part – I) (Semester – I) (Old) Examination, 2015
PHYSICS
Optics and Laser (Paper No. – II)

Day and Date : Monday, 13-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B. :** i) **All questions are compulsory.**
ii) **Neat diagrams must be drawn, wherever necessary.**
iii) **Use of logarithmic table or nonprogrammable calculator is allowed.**
iv) **Figures to the right indicate full marks.**
v) **Answer to every new question must be written on a new page.**

1. Select and write the most appropriate answer from given alternatives for each sub-question. 10
- i) The time 't' of travel a path of length 'x' is extremum when _____
- a) $\frac{dt}{dx} = 0$ b) $\frac{dt}{dx} > 0$ c) $\frac{d^2t}{dx} = 0$ d) None of the above
- ii) The incident rays, near to axis of a lens of large aperture are called _____
- a) axial b) non-axial
c) paraxial d) marginal
- iii) A modification of the Ramsden's eye-piece is _____
- a) Positive eye-piece b) Negative eye-piece
c) Huygen's eye-piece d) Gauss eye-piece
- iv) In the Fraunhofer type diffraction, the edge of an obstacle is illuminated by _____
- a) Spherical wavefront b) Plane wavefront
c) Cylindrical wavefront d) Elliptical wavefront
- v) For normal incidence of light, an angle incidence 'i' is _____
- a) 0° b) 30° c) 45° d) 90°



3. A) Answer **any two** of the following : **6**
- i) Describe any three different characteristics of : Laser.
 - ii) Distinguish between : Plane diffraction grating spectra and Prism spectrum.
 - iii) Focal length of eye lens used in the Huygen's eye-piece is '2 cm'. Calculate :
 - a) Focal length of 'Field Lens'
 - b) Focal length of 'Eye Lens'
 - c) Distance between : Eye Lens and Field Lens.
- B) How the replica of a original plane diffraction grating is prepared ? **4**
4. Answer **any two** of the following : **10**
- i) Describe the construction and working of : Solid State Ruby Laser.
 - ii) Draw a neat ray diagram of Ramsden's Eye-piece and derive an expression for the focal length of it.
 - iii) In a plane diffraction grating 6000 lines per centimeter are there. For second order, an angle of diffraction is 30° . Determine the wavelength of light used.
5. Answer **any one** of the following : **10**
- i) State and explain Fermat's principle of extremum path. By using Fermat's principle, deduce the laws of reflection.
 - ii) Describe briefly an experiment of 'Newton's Rings' to determine the refractive index of liquid. The diameter of 6th dark Newton's ring is changed from 0.34×10^{-2} cm to 0.256×10^{-2} cm when air film is replaced by the liquid film. Calculate the refractive index of the liquid.
-



- 5) The sequence $\left\{ \frac{1}{n} \right\}_{n=1}^{\infty}$ has a limit
- a) 0 b) ∞ c) 1 d) None of these
- 6) If $\{S_n\}_{n=1}^{\infty}$ converges to $L \neq 0$ then $\{(-1)^n S_n\}$
- a) Oscillates b) Converges to zero
c) Converges to 1 d) Diverges to ∞
- 7) Consider the following statements
- i) Every bounded sequence is convergent
ii) Every convergent sequence is bounded; then
- a) Only (i) is true b) Only (ii) is true
c) Both (i) and (ii) are true d) Both (i) and (ii) are false
- 8) The series $\sum_{n=1}^{\infty} \frac{1+n}{1+3n}$ is _____
- a) Convergent b) Oscillates
c) Not convergent d) None of these
- 9) $\sum \frac{1}{n^p}$ converges if
- a) $p \geq 1$ b) $p \leq 1$ c) $p > 1$ d) None of these
- 10) The series $\sum a_n = 1 + \frac{1}{3} - \frac{1}{2} + \frac{1}{5} + \frac{1}{7} - \frac{1}{4} + \frac{1}{9} + \frac{1}{11} - \dots$ _____
- a) Conditionally convergent b) Divergent
c) Conditionally divergent d) None of these

2. Attempt **any five** out of **six** :

10

- 1) $f(x) = x^2$ and $g(x) = \sin x$ for $-\infty < x < \infty$. Show that $f \circ g \neq g \circ f$.
- 2) If $f(x) = x^2$, then find $f^{-1}(16)$ and $f^{-1}(7)$.



3) Find $N \in \mathbb{I}$ such that $\left| \frac{2n}{n+3} - 2 \right| < \frac{1}{5}; n \geq N$.

4) If $\lim_{n \rightarrow \infty} S_n = L, \lim_{n \rightarrow \infty} S_n = M$ then prove that $L = M$.

5) If $\sum a_n$ is convergent series then show that : $\lim_{n \rightarrow \infty} a_n = 0$.

6) Discuss the convergence of the series $\sum \frac{n+2}{10^{10}(n+3)}$.

3. A) Attempt **any two** out of **three** :

6

1) If $\{S_n\}_{n=1}^{\infty}$ is a sequence of non-negative real numbers and if $\lim_{n \rightarrow \infty} S_n = L$ then show that $L \geq 0$.

2) Prove that : If $a_1 + a_2 + a_3 + \dots$ converges to s then $a_2 + a_3 + a_4 + \dots$ converges to $s - a_1$.

3) Prove that the set $\{1, 4, 9, 16, 25, \dots\}$ is countable.

B) Prove that the sequence $\left\{ \left(1 + \frac{1}{n} \right)^n \right\}_{n=1}^{\infty}$ is convergent.

4

4. Attempt **any two** out of **three** :

10

1) Show that, if $\{a_n\}_{n=1}^{\infty}$ is a sequence of positive numbers which is non-increasing

and $\lim_{n \rightarrow \infty} a_n = 0$ then the alternating series $\sum_{n=1}^{\infty} (-1)^{n+1} a_n$ is convergent.

2) If $\{S_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are bounded sequences of real numbers then show that :

$$\liminf_{n \rightarrow \infty} (S_n + t_n) \geq \liminf_{n \rightarrow \infty} S_n + \liminf_{n \rightarrow \infty} t_n.$$

3) If $f : A \rightarrow B$ and $X \subset A, Y \in A$ then show that $f(X \cup Y) = f(X) \cup f(Y)$.



5. Attempt **any two** out of **three** :

10

1) For each $n \in \mathbb{I}$, let $I_n = [a_n, b_n]$ be a non-empty closed bounded interval of real numbers such that :

i) $I_1 \supset I_2 \supset I_3 \supset \dots \supset I_n \supset I_{n+1} \supset \dots$ and

ii) $\lim_{n \rightarrow \infty} (b_n - a_n) = 0$

then show that $\bigcap_{n=1}^{\infty} I_n$ contains precisely one point.

2) Prove that the set of rational numbers is countable.

3) If $\sum_{n=1}^{\infty} a_n$ is divergent series of positive numbers then prove that there is a

sequence $\{\epsilon_n\}_{n=1}^{\infty}$ of positive numbers converges to zero but for which $\sum_{n=1}^{\infty} \epsilon_n a_n$ still diverges.

Seat
No.

B.Sc. (Part – III) (Semester – V) Examination, 2015
STATISTICS
Statistical Inference – I (Special Paper – IX)

Day and Date : Wednesday, 15-4-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions: 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Multiple Choice Questions. Choose the correct alternative : **10**
- i) Estimate and estimator are
a) synonymous b) different
c) related to population d) none of the above
- ii) Unbiasedness is a property associated with
a) small samples b) large samples
c) sample of any size d) none of the above
- iii) Bias of an estimator can be
a) positive b) negative
c) always zero d) none of the above
- iv) If an estimator T_n converges in probability to a parameter θ as n tends to infinity is said to be
a) sufficient b) efficient c) consistent d) unbiased
- v) Mean squared error of an estimator T for a parameter θ is minimum only if
a) bias and var (T) both are zero
b) bias is zero and var (T) is minimum
c) bias is minimum and var (T) is zero
d) none of the above
- vi) Factorisation theorem for sufficiency is known as
a) Rao-Blackwell theorem b) Cramer-Rao theorem
c) Chapman-Robins theorem d) Fisher-Neyman theorem



4. Answer **any two** of the following : **10**

- i) Show that for a sample of size n from $N(\mu, \sigma^2)$, the estimator $T_1 = \sum X_i / (n+1)$, though biased is more efficient than $T_2 = \sum X_i / n$ for estimating μ .
- ii) Prove that Uniformly Minimum Variance Unbiased Estimator (UMVUE) is unique for a parameter θ .

iii) Let X_1, X_2, \dots, X_n be a random sample from $G(\alpha, \beta) = \frac{1}{\alpha \beta^\alpha} e^{-x/\beta} x^{\alpha-1}, 0 < x < \infty$.

Where both α and β are unknown. Obtain sufficient statistics for α and β .

5. Answer **any two** of the following : **10**

- i) State and prove Cramer-Rao inequality for the variance of an unbiased estimator for a parameter θ .
 - ii) Let X_1, X_2, \dots, X_n be a random sample of size n from a Poisson distribution with parameter λ . Find MLE of λ . Also find its variance.
 - iii) Let X_1, X_2, \dots, X_n be a random sample of size n from $N(\mu, \sigma^2)$. Obtain the estimators of the parameters μ and σ^2 by the method of moments.
-



Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
MICROBIOLOGY (Special Paper – IX)
Virology, Extremophiles and Bioinformatics

Day and Date : Wednesday, 15-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Rewrite the sentences by choosing correct answers from given alternatives : **10**
- 1) Protoplasts can be generally used for cultivation of _____
a) TMV b) T₄ phage c) ϕ X-174 d) EB virus
 - 2) Genome of _____ virus is segmented.
a) TMV b) Adeno c) Influenza d) Polio
 - 3) _____ is DNA containing Oncogenic virus.
a) Rous Sarcoma virus b) Mammary tumor virus
c) Epstein-Barr virus d) Leukemia virus
 - 4) On denaturation of DNA, panhandle structures are produced in _____ virus.
a) Papilloma b) Adeno c) Influenza d) SV₄₀
 - 5) In the term NCBI, the letter 'B' stands for _____
a) Biochemical b) Biological
c) Biotechnology d) Bacterial
 - 6) In the productive λ cycle the gene N product acts as _____
a) repressor b) activator c) terminator d) antiterminator
 - 7) One step growth experiment was devised by _____
a) Watson and Crick b) Ellis and Delbruck
c) Beadle and Tatum d) Hershy and Chase
 - 8) Methanaopyrus Kandleri is an example of _____
a) Hyperthermophile b) Thermophile
c) Extreme thermophile d) Acidophile



9) Terminal protein of 55 k is attached to 5' end of DNA of _____ virus.

- a) Influenza b) Adeno c) Pox d) Polio

10) The phage ϕ X 174 contains _____

- a) circular SS DNA b) Linear SS DNA
c) circular SS RNA d) Linear SS RNA

2. Answer **any five** of the following :

10

- i) What is BLAST ?
- ii) How Influenza virus attaches to host cells ?
- iii) What is self assembly of progeny virus particles ?
- iv) How Adenoviruses adsorb to their host cells ?
- v) What are virulent phages ? Give examples.
- vi) What are osmophiles ?
- vii) Give a few examples of Thermophiles.

3. A) Answer **any two** of the following :

6

- i) What is Lysogeny ?
- ii) What is Eclipse period ? Explain.
- iii) Give three criteria used in LHT system.

B) Give brief account of Acidophiles.

4

4. Answer **any two** of the following :

10

- i) Describe briefly types of cancers.
- ii) Discuss briefly adsorption and penetration of influenza virus.
- iii) Give briefly characteristics of cancerous cells.

5. Answer **any two** of the following :

10

- i) Explain briefly Latex Drople method and pattern method of virus enumeration.
 - ii) Give brief account of purification of viruses.
 - iii) Give brief account of cytic cycle of T_4 phages.
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Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
COMPUTER SCIENCE
Visual Programming Special (Paper – IX)

Day and Date : Wednesday, 15-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

1. Choose the correct alternatives : 10

- 1) Visual Studio.Net provides which features
 - a) Debugging
 - b) Application deployment
 - c) Both a) and b)
 - d) All of the above
- 2) Which language is not a true object oriented programming language ?
 - a) VB.Net
 - b) VB6.0
 - c) C++
 - d) None of the above
- 3) Which statement about object is true ?
 - a) One object is used to create one class
 - b) One object can create many classes
 - c) One class can create many objects
 - d) None of the above
- 4) In an event driven programming an event is generated by
 - a) The system
 - b) A users action
 - c) The program itself
 - d) All of the above
- 5) Which statements are optional in an if ... then statement
 - a) if
 - b) then
 - c) else
 - d) Both a) and b)
- 6) How many times in the test expression of select case is evaluated ?
 - a) 0
 - b) 1
 - c) 2
 - d) Once for each case
- 7) Which is not an integer data type ?
 - a) Single
 - b) Byte
 - c) Short
 - d) Integer
- 8) How many constructor a class can have ?
 - a) 0
 - b) 1
 - c) Both a) and b)
 - d) None of the above



- 9) Which property determines whether a control is displayed to the user ?
a) Hide b) Show c) Visible d) Enabled
- 10) What is MSIL ?
a) Multisocket Interface Library
b) Microsoft Interface Language
c) Microsoft Intermediate Language
d) Microsoft Integer Long
2. Answer the following : 10
- 1) What is .Net namespaces ?
2) What is an assembly ?
3) Explain the difference between ref. and out parameter.
4) What are sealed classes ?
5) How the finally statement used ?
3. A) Answer **any two** of the following : 6
- i) Explain CTS and CLS in brief.
ii) What is an abstract class ? Explain with example.
iii) What is an interface ? Explain with example.
- B) What is reflection ? Explain with example. 4
4. Answer **any two** of the following : 10
- i) Explain in detail using an appropriate programming example the use of exception handles.
ii) What is multithreading ? Write a C# program to demonstrate multithreading.
iii) What is stream ? Explain stream reader and stream writer with example.
5. Answer **any two** of the following : 10
- i) What is thread synchronization ? Explain with example.
ii) What is event ? Explain with example.
iii) What is boxing and unboxing ?
-



Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
PHYSICS (Special Paper – X)
Solid State Physics

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Neat diagrams must be drawn wherever necessary.**
4) **Use of log table and calculator is allowed.**

1. Select the correct alternative : **10**
- i) If the characteristics of unit cell are $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$, the crystal system is _____
- a) cubic b) orthorhombic
c) monoclinic d) triclinic
- ii) The co-ordination number of fcc structure is _____
- a) 4 b) 6 c) 8 d) 12
- iii) The ratio of electrical to thermal conductivity for all metals is proportional to _____
- a) T b) T² c) T³ d) T⁴
- iv) The Bravais lattice of NaCl is _____
- a) sc b) bcc c) fcc d) hcp
- v) The total number of atoms in unit cell of bcc structure is _____
- a) 1 b) 2 c) 4 d) 6
- vi) The width of forbidden energy band in semiconductors is about _____ ev.
- a) 0 b) 1 c) 7 d) ∞
- vii) Superconductivity was discovered by _____
- a) Miller b) Bravais
c) de-Broglie d) Kammerlingh Onnes
- viii) Hall coefficient is negative for _____
- a) Protons b) Neutrons c) Electrons d) Holes



Seat No.	
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**B.Sc. (Part – III) (Semester – V) Examination, 2015
CHEMISTRY**

Special Paper – X : Inorganic Chemistry

Day and Date : Thursday, 16-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) *All questions are compulsory.*
2) *Draw neat diagram and give equations wherever necessary.*
3) *Figures to the right indicate full marks.*

1. Select the most correct alternative for the following and rewrite the sentences : **10**

- 1) CFSE for d^7 octahedral complex is _____ Dq .
a) -4 b) -6 c) -8 d) -12
- 2) In low spin octahedral complex magnitude Δ_0 is _____ than pairing energy.
a) Very low b) More c) Intermediate d) Less
- 3) According to CFT bonding between Metal and Ligand is _____ in nature.
a) Co-ordinate b) Covalent c) Ionic d) Metallic
- 4) Artificial transmutation was first reported by
a) Chadwick b) Rutherford
c) Phillips d) Rutherford and Chadwick
- 5) Myoglobin has molecular weight _____ amu.
a) 17000 b) 64000 c) 15000 d) 60000
- 6) ${}_{13}^{27}\text{Al} + {}_0^1n \rightarrow {}_{12}^{27}\text{Mg} + \dots\dots$
a) ${}_1^1\text{H}$ b) ${}_1^2\text{H}$ c) γ -rays d) ${}_2^4\text{He}$



- 7) Monomers having at least _____ functional group only form polymers.
a) Two b) Three c) One d) Five
- 8) The backbone in fluorocarbons consist of structural unit of
a) C – F b) –C–C– c) F – F d) C – H
- 9) Haemoglobin contains four heme group attached to, a large protein called
a) heme b) active group c) globin d) porphyrins
- 10) Particle size of nanomaterials is in between
a) 100 – 1000 nm b) 10 – 100 μ m
c) 10 – 100 nm d) below 10 nm

2. Answer **any five** of the following : 10
- i) Calculate the CFSE for strong and weak d^5 configuration for octahedral complexes.
 - ii) Give the limitations of CFT.
 - iii) Discuss the artificial radioactivity.
 - iv) Define essential element and trace element.
 - v) Explain the polymer backbone.
 - vi) Discuss the co-operativity in haemoglobin.
3. A) Answer **any two** of the following : 6
- i) Explain in brief application of nanoparticles.
 - ii) Discuss Jahn-Teller distortion.
 - iii) Give the difference between organic and inorganic polymers.
- B) Draw a neat labelled molecular orbital energy level diagram for $[\text{Co}(\text{NH}_3)_6]^{3+}$. 4
4. Answer **any two** of the following : 10
- i) Explain Nuclear fission reaction.
 - ii) Give the difference between Haemoglobin and Myoglobin.
 - iii) Explain the application of radioisotope in chemical investigation.
5. Answer **any two** of the following : 10
- i) On the basis of MOT. Explain the complex $[\text{C}_0\text{F}_6]^{3-}$.
 - ii) Explain the use of uranium, thorium and plutonium in nuclear energy.
 - iii) Discuss the preparation and properties of phosphonitrilic compounds.
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Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
BOTANY (Special Paper – X)
Gymnosperms and Palaeobotany

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** i) **All questions are compulsory.**
ii) **All questions carry equal marks.**
iii) **Draw neat labelled diagrams wherever necessary.**
iv) **Figures to the right indicate full marks.**

1. Rewrite the following sentences choosing the correct alternative. (1×10=10)
- 1) The wood of Zamia is _____
a) monoxyllic b) pycnoxyllic c) porous d) none of these
 - 2) The phyllotaxy in Zamia is _____
a) Simple b) Pinnately compound
c) Palmately compound d) De compound
 - 3) The xylem in young root of Gnetum is _____
a) diarch and exarch b) diarch and endarch
c) mesarch d) none of these
 - 4) Because of only _____ Gnetum is a gymnosperm.
a) poly embryony b) orthotropous ovule
c) pollination by wind d) naked seeds
 - 5) _____ is a male fructification of Lyginopteris.
a) Enigmocarpon b) Crossotheca Sagittata
c) Laginostoma d) Sphenopteris
 - 6) In palaeostachys the sporangiophore makes _____ degree angle with the axis.
a) 30 b) 40 c) 45 d) 60
 - 7) Order cycadeoidales is also called order _____
a) Bennettiales b) Coniferales c) Gnetales d) Cordaitales



8) Sclerotic nests are formed by _____ cells in pith of Lyginopteris oldhamia.

- a) Parenchymatous b) Collenchymatous
c) Aerenchymatous d) Sclerenchymatous

9) Enigmocarpon belongs to family _____

- a) Lythraceae b) Liliaceae c) Myrtaceae d) Fabaceae

10) Microfossils play important role in _____

- a) oil formation b) oil deposition
c) oil exploration d) oil degradation

2. Answer **any five** of the following :

10

- 1) What is polyembryony ?
- 2) Enlist Indian species of Gnetum.
- 3) What are protoxylem canals ?
- 4) What is impression ?
- 5) Give classification of Enigmocarpon.
- 6) What are microfossils ?

3. A) Answer **any two** of the following :

6

- 1) Describe in brief female cone of Gnetum.
- 2) Describe T. S. of Zamia stem.
- 3) Give classification of Lyginopteris with form generas.

B) What is geological time scale ? Enlist different era with their periods.

4

4. Answer **any two** of the following :

10

- 1) Describe the structure of female gametophyte and embryo of Zamia.
- 2) What are fossils ? Describe cast and amber type of fossils.
- 3) What is fossilization ? Describe process and favorable conditions of fossilization.

5. Answer **any two** of the following :

10

- 1) Describe V. S. of Gnetum ovule, comment up on morphological nature of its envelopes.
- 2) Give the process of carbon dating.
- 3) Explain coal and crude oil are biotic in origin.



- vi) Bacteria are said to be
- | | |
|--------------------|---------------------|
| a) Akaryotic cell | b) Eukaryotic cell |
| c) Dikaryotic cell | d) Prokaryotic cell |
- vii) The unit measurement of bacterial cell is
- | | |
|---------------|---------------|
| a) Millimeter | b) centimeter |
| c) Meter | d) Micron |
- viii) A mathematical relationship was developed to explain the equilibrium between frequencies and alleles is called
- | | |
|-----------------|-----------------------|
| a) Mendel's law | b) Hardy-Weinberg law |
| c) Darwin's law | d) Sting's law |
- ix) The command Alt+A is used to
- | | |
|--------------------|--------------------|
| a) create the file | b) delete the file |
| c) select text | d) save the text |
- x) In the perfect positive co-relation value of $r =$
- | | | | |
|-------|-------|------|--------|
| a) +1 | b) -1 | c) 0 | d) 0.5 |
|-------|-------|------|--------|

2. Answer **any five** of following :

10

- 1) Mode
- 2) Merits of standard Deviation
- 3) Genetic drift
- 4) Importance of Bioinformatics
- 5) Rabies virus
- 6) Salmonella bacteria.

3. A) Answer **any two** of following :

6

- 1) Describe the Hardy-Weinberg Law of genetic equilibrium.
- 2) Explain in brief the disease Elephantiasis.
- 3) Give an account of swine flue disease.

B) Prepare a frequency table with the class-intervals 18-21, 22-25, 26-29 etc. from the following figures which are the weights of 50 students :

4

33, 52, 18, 22, 25, 30, 38, 37, 32, 25,
 24, 33, 42, 36, 26, 37, 39, 45, 31, 39
 29, 32, 40, 35, 26, 38, 39, 33, 30, 34
 33, 45, 28, 41, 47, 34, 22, 38, 28, 37
 29, 46, 27, 23, 36, 37, 48, 31, 48, 44



4. Answer **any two** of following : **10**

- 1) Describe in brief three level of Bioinformatics in structural biology.
- 2) Describe the various types of correlation.
- 3) Give an brief account of pathogenicity of Rickettsiae.

5. Answer **any one** of following : **10**

- 1) Give an account of pathogenicity of Entamoeba histolytica. Add a note on it's control.
 - 2) Define statistical table and describe different parts of statistical table.
-



Seat No.	
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B.Sc. (Part – I) (Semester – I) (Old) Examination, 2015
GEOGRAPHY (Paper – II)
Physical Geography (Climatology)

Day and Date : Monday, 13-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) *All questions are compulsory.*
2) *Draw neat diagrams wherever necessary.*
3) *Use of stencils is allowed.*
4) *Figures to the right indicate full marks.*

1. Select the proper answers from the given below and rewrite the sentences. **10**

- 1) _____ is the science that studies various climates on the earth.
- a) Climatology b) Meteorology
c) Geomorphology d) Oceanography
- 2) _____ zone lies between $66\frac{1}{2}^{\circ}$ and poles in both hemisphere.
- a) Torrid b) Temperate
c) Frigid d) No climatic
- 3) The proportion of nitrogen gas in the atmosphere is _____ %.
- a) 20.96 b) 78.08
c) 0.03 d) 25.27
- 4) The surface temperature of sun is _____ °C .
- a) 6000 b) 600
c) 5000 d) 500
- 5) The atmospheric pressure at 11000 metre altitude from mean sea level is _____ millibars.
- a) 1000 b) 500
c) 250 d) 125



6) The temperature decreases with increasing altitude at the rate of _____ °C per 160 meters.

- a) 1
- b) 2
- c) 3
- d) 4

7) The lines joining the places of equal atmospheric temperature, are called as _____

- a) isotherms
- b) isobars
- c) isohyets
- d) isobaths

8) The westerlies wind blowing near 40°s latitude, is called as _____

- a) seasonal winds
- b) roaring fourties
- c) furious fifties
- d) shrieking sixties

9) The value of solar constant, on the earth surface is _____ cal/cm²/min.

- a) 1
- b) 2
- c) 3
- d) 4

10) In _____ tropical cyclones are called as 'Hurricanes'.

- a) North America
- b) India
- c) Japan
- d) Australia

2. Answer in short (**any five**) :

10

- 1) Branches of climatology.
- 2) What is mean by insolation ?
- 3) State the Farrel's law.
- 4) Importance of ozone gas in the atmosphere.
- 5) Normal lapse rate of temperature.
- 6) State the various elements of weather.



3. A) Write brief answer (**any two**) : **6**
- 1) Describe polar winds.
 - 2) Vertical distribution of temperature.
 - 3) Ionosphere.
- B) State the composition of atmosphere. **4**
4. Write short answers (**any two**) : **10**
- 1) Define climatology and explain its importance in geography.
 - 2) State the structure of atmosphere.
 - 3) Define cyclones and its explain its impact on human occupation.
5. Write short answers (**any two**) : **10**
- 1) Describe anti trade winds in detail.
 - 2) Describe the factors affecting on the distribution of insolation on earth surface.
 - 3) Distinguish between weather and climate. State elements of climate.
-



Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
MATHEMATICS (Special Paper – X)
Abstract Algebra

Day and Date : Thursday, 16-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative of the following : 10
- 1) The characteristic of Z_n is
 - a) $n - 1$
 - b) $n + 1$
 - c) n
 - d) n^2
 - 2) Let P be a prime number then the number of generators of cyclic group Z_p^r where r is an integer ≥ 1 are
 - a) $p^r - p^{r-1}$
 - b) p^r
 - c) p^{r-1}
 - d) $p^r + p^{r+1}$
 - 3) Every group of order 11 is
 - a) Cyclic and abelian
 - b) Abelian but not cyclic
 - c) Cyclic but not abelian
 - d) Neither cyclic nor abelian
 - 4) If H and K are two subgroups of group G then HK is subgroup of G iff
 - a) $HK = \{e\}$
 - b) $HK = KH$
 - c) $HK = H^{-1}K^{-1}$
 - d) None of these
 - 5) A one-one homomorphism from G to G^1 is called
 - a) Monomorphism
 - b) Epimorphism
 - c) Endomorphism
 - d) Automorphism



- 6) Which of the following is not true ?
- Every field is division ring
 - Every field is integral domain
 - A finite integral domain is field
 - Every integral domain is field
- 7) One of the solution for the equation $15x \equiv 6 \pmod{21}$ is
- 5
 - 6
 - 7
 - 8
- 8) Let $f : R \rightarrow R'$ be a ring homomorphism then f is one-one iff $\text{Ker} f =$
- $\{1_R\}$
 - $\{1_{R'}\}$
 - $\{0_R\}$
 - $\{0_{R'}\}$
- 9) If ϕ is Euler's ϕ function then $\phi(13) =$
- 1
 - 13
 - 12
 - 8
- 10) Let R be commutative ring with unity then $\frac{R}{P}$ is integral domain iff
- Prime ideal
 - Maximal ideal
 - Both (a) and (b)
 - None of these

2. Attempt **any five** of the following :

10

- Prove that the identity element in a group G is unique.
- State Fermat's little theorem.
- Whether the cycle $(1\ 2\ 3)(4\ 6\ 5)$ is even or odd permutation.
- If D is an integral domain and $a, b, c \in D$, $a \neq 0$ and $ba = ca$ then prove that $b = c$.
- If U is an ideal of R and $1 \in U$ then prove that $U = R$.
- Define (i) Ring with unity (ii) Characteristic of Ring R .

3. A) Attempt **any two** of the following :

6

- Prove that field F has no proper ideals.
- Apply Euclidean algorithm to compute $(1001, 357)$.
- Show that $G = \{1, 2, 3, 4, 5, 6\}$ is finite abelian group under multiplication modulo 7.

B) Let $\phi : G \rightarrow G'$ is group homomorphism then prove that ϕ is one-one iff $\text{Ker } \phi = \{e\}$.

4



4. Attempt **any two** of the following : **10**
- 1) Let H be a subgroup of a group G prove that product of two right coset of H in G is right coset iff H is normal subgroup of G .
 - 2) Let R be commutative ring with unity then prove that every maximal ideal of R is prime ideal.
 - 3) If D is an integral domain then prove that characteristic of D is either 0 or prime.
5. Attempt **any one** of the following : **10**
- 1) If P is prime no. and G is group of order P then prove that G is isomorphic to Z_p .
 - 2) Prove that the set of matrices of order 2×2 forms a ring with respect to matrix addition and matrix multiplication.
-



Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
STATISTICS
Sampling Techniques (Special Paper – X)

Day and Date : Thursday, 16-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Soundless calculators are allowed.**

1. Choose most appropriate alternative from those given in **each** case. **10**
- i) The number of possible samples of size n out of N population units without replacement is
- a) ${}^N C_n$ b) $n!$ c) N^n d) none of these
- ii) Probability of including a specified unit in a sample of size n selected from N units is
- a) $\frac{1}{n}$ b) $\frac{1}{N}$ c) $\frac{n}{N}$ d) none of these
- iii) An estimator can possess
- a) a fixed value b) any value
c) both a and b d) neither a nor b
- iv) Stratified random sampling belongs to the category of
- a) judgement sampling b) subjective sampling
c) controlled sampling d) none of these
- v) Systematic sampling means
- a) selection of n contiguous units
b) selection of n units situated at equal distances
c) selection of n largest units
d) none of these



- vi) Sampling errors can be reduced by
- choosing a proper random sampling
 - selecting a sample of adequate size
 - using a suitable formula for estimation
 - all of these
- vii) Two stage sampling design is more efficient than single stage sampling if the correlation between units in the first stage is
- negative
 - positive
 - zero
 - none of these
- viii) A population is divided into clusters and it was found that within cluster variation was less than the variation between clusters. If a sample of units was selected from each cluster, the sampling procedure used was
- cluster sampling
 - multistage sampling
 - stratified sampling
 - none of these
- ix) If we have a sample of size n from a population of N units, the finite population correction is
- $\frac{N-1}{N}$
 - $\frac{n-1}{N}$
 - $\frac{N-n}{N}$
 - none of these
- x) In simple random sampling with replacement, the same sampling unit may be included in the sample
- more than once
 - only once
 - only twice
 - none of these

2. Attempt **any five** of the following.

10

- Explain the concept of sampling frame.
- Define regression estimator.
- Give real life situations of two stage sampling.
- Explain non sampling errors.
- Define ratio estimate of population total.
- Describe cluster sampling.



3. A) Answer **any two** of the following. **6**
- i) Explain multistage sampling.
 - ii) State the characteristics of a good questionnaire.
 - iii) Describe stratified random sampling method where sample is drawn.
- B) Explain systematic sampling as a particular case of cluster sampling. **4**
4. Attempt **any two** of the following. **10**
- i) Obtain an unbiased estimator of population total and its variance in case of Neyman's optimum allocation.
 - ii) State the difference between ratio estimators and regression estimators.
 - iii) What do you mean by sampling for proportions ? Obtain an unbiased estimator for population total.
5. Answer **any two** of the following. **10**
- i) Obtain unbiased estimator population mean and derive its standard error in case of systematic sampling.
 - ii) Obtain an unbiased estimator of population total under cluster sampling. Give any two real life situations where cluster sampling is used.
 - iii) What difficulties we face in planning execution and analysis of sample survey ?
-

Seat
No.

B.Sc. (Part – III) (Semester – V) Examination, 2015
GEOLOGY
Geomorphology (Special Paper – X)

Day and Date : Thursday, 16-4-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labelled diagrams wherever necessary.**

1. Fill in the blanks with correct answer from the given options : **10**
- 1) The orderly and sequential stages of development of river is postulated by
a) Steno b) Hutton c) W. M. Davis d) Penk
 - 2) On the steeper slope, the shear stress or tangential component of gravity, gt _____ and the perpendicular component of gravity, gp _____
a) remains stable-decreases b) decreases-remains stable
c) increases-decreases d) decreases-increases
 - 3) Alluvial fans and alluvial cones, meanders and loops, and natural levees are characteristic of _____ stage of fluvial erosion cycle.
a) youth b) mature
c) old d) none of these
 - 4) Height of hill measured from its adjacent valley base is its
a) absolute relief b) initial relief
c) relative relief d) none of these
 - 5) The level below which river cannot erode vertically downward is also called as
a) lower level erosion b) upper level erosion
c) middle level of erosion d) base level of erosion
 - 6) The angle of repose for stability of slope is
a) 20° to 47° b) 35° to 37° c) 20° to 27° d) 30° to 37°
 - 7) In the old stage, river valley sides show _____ slope.
a) convex b) concave
c) rectilinear d) level to very gentle

P.T.O.



8) Knick points are indicated by presence of

- | | |
|---------------|------------------|
| a) delta | b) waterfall |
| c) meandering | d) none of these |

9) Slope angle greater than 45° can be classified as

- | | |
|-----------------|----------------------------|
| a) almost level | b) very gentle |
| c) moderate | d) precipitous to vertical |

10) Which of the following should considered when studying the history of landscape development ?

- | | |
|---------------------------|-------------------|
| a) Pleistocene glaciation | b) Jurassic fauna |
| c) Plate motions | d) None of these |

2. Answer **any five** of the following : **10**

- i) What is pene plane ?
- ii) How hill slopes are measured ?
- iii) Which rocks are believed to be stable even at slope angle greater than 45° ?
- iv) Describe width of valley in old stage.
- v) What is tectonic slope ?
- vi) Which slope element occurs at the top of the hill ?

3. A) Answer **any two** of the following : **6**

- i) What is transitional sliding ?
- ii) How incised meanders indicate rejuvenation ?
- iii) Give any three preventive measures for mass movement.

B) Draw a table showing classification of mass movement. **4**

4. Answer **any two** of the following : **10**

- i) Monitoring and control on mass movement.
- ii) What are characters of youth stage in cycle of erosion ?
- iii) Explain how jointing patterns affect on the mass movement.

5. Answer **any two** of the following : **10**

- i) Describe types of rejuvenation.
- ii) Describe elements of slope.
- iii) Describe in brief role of water in mass movement.



Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
MICROBIOLOGY (Special Paper – X)
Industrial Microbiology

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) Draw **neat** labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by selecting correct answers from given alternatives.

10

- 1) _____ is used for pretreatment of grape juice during wine production.
a) CO₂ b) SO₂ c) HCl d) NaCl
- 2) For making Champagne wine specially selected _____ are used.
a) Molasses b) Grapes
c) White table wine d) Ethanol
- 3) Saccharomyces cerevisiae variety ellipsoides is used for production of _____
a) Wine b) Lysine
c) Streptomycin d) rDNA products
- 4) _____ is used for commercial fermentation of Dextran.
a) S. durens b) Leuconostoc mesenteroides
c) C. diphtheriae d) B. Megaterium
- 5) Biopolymers are extracted and purified by precipitation with _____
a) Methanol b) NaOH
c) HCl d) Phosphoric acid
- 6) Interferon produced by rDNA technology is used as _____ protein.
a) Antibacterial b) Antiviral c) Antifungal d) Antitumor
- 7) Streptomycin is produced by _____
a) Penicillium notatum b) C. glutamicum
c) Streptomyces griseus d) S. cerevisiae

P.T.O.



8) E. Coli auxotrophs and Aerobacter aerogens are used for production of _____

- | | |
|---------------|-----------------|
| a) L-lysine | b) Streptomycin |
| c) Penicillin | d) Citric acid |

9) Barley Malt is used for _____ fermentation.

- | | | | |
|---------|---------|----------------|-----------|
| a) Wine | b) Beer | c) Citric acid | d) Lysine |
|---------|---------|----------------|-----------|

10) High speed cooling centrifuge is used for recovery and purification of _____ sensitive products.

- | | | | |
|---------|-----------|---------|---------|
| a) Acid | b) Alkali | c) Heat | d) Salt |
|---------|-----------|---------|---------|

2. Answer **any five** of the following :

10

- i) Write types of beer.
- ii) List media used for sterility testing.
- iii) List media used for streptomycine fermentation.
- iv) What is curdling of milk ?
- v) Define centrifugation.
- vi) Give functions of Dextran.
- vii) Types of cheese.

3. A) Answer the following questions in brief **any two** :

6

- i) Production of Idli.
- ii) Write in brief about whole broth processing.
- iii) Give an account on pyrogenicity testing.

B) Describe computer applications in fermentation industry.

4

4. Answer **any two** of the following :

10

- i) Write in detail on Good Manufacturing Practices.
- ii) Describe the production of rDNA Insulin.
- iii) Write on fermentation economics.

5. Answer **any two** of the following :

10

- i) Describe the production of rDNA Interferon.
- ii) Describe L-lysine Fermentation.
- iii) Explain the recovery of fermentation product by solvent extraction and chromatography.



Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
ELECTRONICS (Special Paper – X)
Fundamentals of Communication

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :**
- 1) Figures to **right** indicate **full** marks.
 - 2) Draw **neat** diagrams **wherever** necessary.
 - 3) **Use** of log table and calculator is **allowed**.
 - 4) **All** questions are **compulsory** and **equal** marks.

1. Select the correct alternative for the following : **10**
- i) Which of the following is a major communication medium, used now days ?
- | | |
|-------------------|-----------------------|
| a) Wires / cables | b) Fiber-optic cables |
| c) Free-space | d) Water |
- ii) Tunning a super-heterodyne is done by varying the frequency of its _____
- | | |
|-------|---------------------|
| a) RF | b) Local oscillator |
| c) IF | d) Mixer |
- iii) A bell of telephone instrument is actuated, by receipt of _____ from telephone exchange.
- | | |
|-----------------------|-----------------|
| a) a.c. voltage | b) a.c. current |
| c) modulating voltage | d) d.c. voltage |
- iv) The no. of scanning lines used in PAL system for TV transmission are _____
- | | |
|--------|------------------|
| a) 525 | b) 565 |
| c) 655 | d) None of these |



- v) A radio-wave that propagates through space by _____
 a) Surface-waves b) Space-waves
 c) Sky-waves d) All of these
- vi) The total side-band power, is what percentage of the carrier power, for 100% modulation ?
 a) 25% b) 50%
 c) 100% d) None of these
- vii) Current distribution in full-wave dipole antenna is _____
 a) Non-uniform b) Uniform
 c) Random distributed d) None of these
- viii) Which two sine-wave frequencies are produced, when the number (8) key is pressed of DTMF dialer ?
 a) 697 and 1477 Hz b) 852 and 1336 Hz
 c) 770 and 1209 Hz d) 941 and 1633 Hz
- ix) The audio-broad cast in TV is transmitted by FM. The maximum deviation permitted is 25 KHz and maximum modulating frequency is 15 KHz, then the deviation ratio is _____
 a) 0.60 b) 0.96 c) 1.66 d) 1.84
- x) A propagation of radio-waves above 30 KHz, is achieved by means of _____
 a) Sky waves b) Ground waves
 c) Micro waves d) All of these

2. Answer **any five** of the following :

10

- i) Define characteristics of radio-receiver.
- ii) Distinguish between AM and FM considering noise.
- iii) Give the concepts of ASK and FSK.
- iv) Enlist the picture qualities in Television.
- v) What is subscriber local loop ?
- vi) Draw the frequency spectrum of video and audio transmission in TV.



3. A) Answer **any two** of the following : **6**
- i) Distinguish between Yagi and parabolic antennas.
 - ii) What is meant by VSB operation of AM ? Why it is used for TV transmission ?
 - iii) Give the different types of communication system in brief.
- B) Explain the PAM, PWM, PPM with the help of waveforms. **4**
4. Answer **any two** of the following : **10**
- i) Explain ratio-detector, as frequency demodulator.
 - ii) Write a note on composite-video signal in TV transmission.
 - iii) Derive the expression, for power distribution in the side bands of AM.
5. Answer **any one** of the following : **10**
- i) Explain electronic telephone exchange with essential diagram and give the sequence of events, corresponding mechanism in transmit mode of telephone hand-set.
 - ii) Why there is need of modulation ? Give the merits of digital modulation over analogue modulation techniques and explain pulse-code modulation.
-



Seat No.	
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B.Sc. III (Semester – V) Examination, 2015
COMPUTER SCIENCE (Special Paper – X)
Core Java

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

Instructions : 1) **All questions are compulsory.**
2) **Figure to the right indicates full marks.**

1. Choose correct alternatives : **10**

- 1) Which is valid keyword in Java ?
a) interface b) string c) float d) unsigned
- 2) We can block the running thread using _____ method.
a) sleep b) wait c) suspend d) all
- 3) _____ type exception caused when a conversion between strings and number fails.
a) Arithmetic Exception b) IO Exception
c) Number Format Exception d) None
- 4) When method is override then all syntax are same.
a) True b) False
- 5) A class can not be sub classed is called
a) abstract b) super c) final d) static
- 6) By default _____ object is not synchronised.
a) Vector b) ArrayList c) Hashtable d) None of these
- 7) _____ package is imported implicitly.
a) java.applet b) java.util c) java.lang d) java.io
- 8) _____ is super class of Exception class.
a) Throwable b) Runnable c) Exception d) String

P.T.O.



9) Garbage collection automatically take place in JVM.

- a) True b) False

10) JAR stands for

- a) Java Archive b) Java Archive Runner
c) Java Application Runner d) None of these

2. Attempt **any five** questions from the following : **10**

- 1) Define 'Object'.
- 2) What is Package ?
- 3) Is Java a pure object oriented programming language ?
- 4) Explain wait () method.
- 5) Define 'Iostream'.
- 6) What is serialization ?

3. A) Attempt **any two** of the following : **6**

- 1) Differentiate between 'static variable' and 'instance variable'.
- 2) Why does java not supporting for operator overloading ?
- 3) What is an Abstract class ? What is its purpose ?

B) Write a program to check entered number is prime or not. **4**

4. Attempt **any two** of the followings : **10**

- 1) Write a program to demonstrate interface.
- 2) Write a program to write five students records in a file.
- 3) Write a program to demonstrate user defined exception with example.

5. Attempt **any two** questions from the followings : **10**

- 1) Explain 'Thread life cycle' in detail.
 - 2) Explain working of JVM.
 - 3) Explain 'this' keyword with example.
-

Seat
No.

B.Sc. – III (Semester – V) Examination, 2015
PHYSICS (Special Paper – XI)
Classical Mechanics and Spectroscopy

Day and Date : Friday, 17-4-2015

Max.Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :**
- i) **All questions are compulsory.**
 - ii) **Figures to the right indicate full marks.**
 - iii) **Neat diagrams must be drawn wherever necessary.**
 - iv) **Use of log table or calculator is allowed.**

1. Select correct alternative :

10

- i) Selection rule for j in emission transitions is
 - a) $\Delta j = 0$
 - b) $\Delta j = \pm 1$
 - c) $\Delta j = 0, \pm 1$
 - d) $\Delta j = \pm 2$
- ii) Good quantum numbers in anomalous Zeeman effect are
 - a) n, l, m_l, m_s
 - b) n, l, j, m_j
 - c) n, l, j, s
 - d) n, l, s, m_s
- iii) Capacity of a shell to hold electrons is
 - a) $2n^2$
 - b) $2(2l + 1)$
 - c) $(2l + 1)$
 - d) n^2
- iv) Mechanics of a particle is contained in the Newton's _____ law of motion.
 - a) First
 - b) Second
 - c) Third
 - d) Fourth
- v) Principal of virtual work is expressed by the equation
 - a) $\sum_i \vec{F}_i \cdot \delta \vec{r}_i = 0$
 - b) $\sum_i \vec{F}_i^a \cdot \delta \vec{r}_i = 0$
 - c) $\sum_i \left(\vec{F}_i - \vec{P}_i \right) \delta \vec{r}_i = 0$
 - d) $\sum_i \left(\vec{F}_i^{(a)} - \vec{P}_i \right) \delta \vec{r}_i = 0$

P.T.O.



- vi) On the earth, the maximum magnitude of the Coriolis acceleration is at the
- a) Equator
 - b) North and South poles
 - c) At the latitude 45°
 - d) At the latitude 135°
- vii) When constraints are introduced into a system, its number of degrees of freedom
- a) Is reduced
 - b) Is increased
 - c) Remains the same
 - d) Becomes zero
- viii) Electronic spectra of diatomic molecules occurs in
- a) Visible and uv region
 - b) Microwave region
 - c) Infrared region
 - d) X-ray region
- ix) The reduced Plank's constant is given by
- a) $\frac{h}{\pi}$
 - b) h
 - c) $\frac{h}{2\pi}$
 - d) $\frac{2h}{\pi}$
- x) Raman shift for Stoke's lines is
- a) Positive
 - b) Negative
 - c) Zero
 - d) Both a) and b)

2. Attempt **any five** :

10

- i) What are shells and subshells ?
- ii) What is Paschen back effect ?
- iii) Give properties of Raman lines.
- iv) State the conservation theorems for linear momentum and angular momentum of a particle.
- v) Define scleronomus and rheonomous constraints.
- vi) Define inertial and non-inertial frames of reference.



3. A) Attempt **any two** : **6**
- i) Write a note on first order stark effect in hydrogen.
 - ii) What are the difficulties introduced by constraints in the mechanical problems ?
 - iii) What is Coriolis's acceleration ? When does it come into effect ?
- B) The Raman exciting line in an experiment is 4358 \AA . A sample gives Stoke's line at 4458 \AA . Calculate the Raman shift. **4**
4. Attempt **any two** : **10**
- i) Solve the Lagrangian equation for the motion of a bead sliding on rotating wire in forced free space.
 - ii) Write difference between Raman spectra and infrared spectra.
 - iii) Explain anomalous Zeeman effect.
5. Attempt **any one** : **10**
- i) Explain in brief optical spectral series in sodium with energy level diagram. Give an account of doublet fine structure based on electron spin orbit interaction.
 - ii) State and prove conservation theorem for linear momentum and angular momentum for a system of particles.
-



Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
CHEMISTRY (Special Paper – XI)
Organic Chemistry

Day and Date : Friday, 17-4-2015

Max. Marks : 50

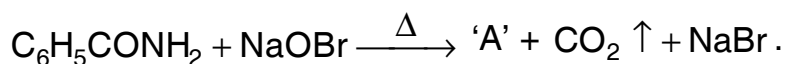
Time : 3.00 p.m. to 5.00 p.m.

- N. B. :** 1) **All questions are compulsory.**
2) Draw **neat** diagrams and give equations **wherever necessary.**
3) Figures to the **right** indicate **full** marks.
4) Spectroscopic chart supplied by the university is **allowed.**

1. Choose the most correct alternative for **each** of the following : **10**
- i) For the determination of the functional groups _____ spectroscopy is more useful.
a) UV b) Mass c) IR d) NMR
- ii) In NMR spectrum of toluene, the peak area ratio is _____
a) 5 : 3 b) 2 : 1 c) 3 : 1 d) 1 : 1
- iii) In a mass spectrometer, a stream of _____ is generated from the vapourised sample using electron beam.
a) free radicals b) molecules
c) anions d) cations
- iv) The most unstable conformation of cyclohexane is the _____
a) half chair form b) chair form
c) boat form d) twist boat form
- v) In Knoevenagel reaction, carbanion is produced from active methylene compound by using suitable _____
a) Acid b) Base
c) $AlCl_3$ d) None of these



- v) Predict the product 'A' of the following reaction and write the name of this reaction.

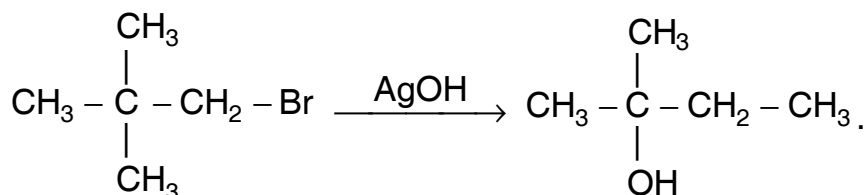


- vi) Explain ketonic hydrolysis of ethyl acetoacetate.

3. A) Answer **any two** of the following :

6

- i) Explain the basic principle involved in mass spectroscopy with schematic diagram of a mass spectrometer.
- ii) Sketch the mechanism of transformation



- iii) Out of two isomeric compounds A and B having molecular formula $\text{C}_4\text{H}_8\text{O}$, one gives Tollen's reagent test positive and other one negative. They show IR bands as below :

Comp. A : 2720 cm^{-1} , 1720 cm^{-1}

Comp. B : 1720 cm^{-1}

Write their possible structures.

- B) Out of boat and chair forms of cyclohexane which one is more stable ? Why ? 4

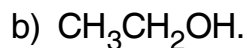
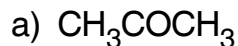
4. Answer **any two** of the following :

10

- i) Explain the mechanism of Wittig reaction.
- ii) Write the synthetic applications of diethyl malonate in the preparation of
- a) Methyl diethyl malonate
- b) Alanine
- c) Barbituric acid.



iii) What is chemical shift ? How is it measured ? How many NMR signals are possible for following compounds ?



5. Answer **any two** of the following :

10

i) Explain different types of ions generated in mass spectroscopy with suitable examples.

ii) What is keto-enol tautomerism ? How does it differ from resonance ? Explain with suitable example.

iii) Deduce the structure of the compound from the following spectral data :

Molecular formula : C_7H_8

m/z : 92

IR (cm^{-1}) : 3080, 1600, 1585, 1500, 1450.

NMR : 2.2 δ (S, 3H)

7.1 δ (S, 5H).



TABLE - 1
Characteristic Infrared Absorptions of Functional Groups

GROUP	FREQUENCY RANGE cm^{-1}	INTENSITY
A. Alkyl		
C - H (stretching)	2853-2962	(m - s)
Isopropyl - $\text{CH}(\text{CH}_3)_2$	1380 - 1385	(s)
tert - Butyl - $\text{C}(\text{CH}_3)_3$	and 1365 - 1370 1385 - 1395 and - 1365	(s) (m) (s)
B. Alkenyl		
C - H (stretching)	3010 - 3095	(m)
C = C (stretching)	1620 - 1680	(v)
R - $\text{CH} = \text{CH}_2$	985 - 1000 and 905 - 920	(s) (s)
$\text{R}_2\text{C} = \text{CH}_2$	(out of plane C-H bendings) 880 - 900	(s)
cis - $\text{RCH} = \text{CHR}$	675 - 730	(s)
trans - $\text{RCH} = \text{CHR}$	960 - 975	(s)
C. Alkynyl		
$\equiv \text{C} - \text{H}$ (stretching)	- 3300	(s)
$\text{C} \equiv \text{C}$ (stretching)	2100 - 2260	(v)
D. Aromatic		
Ar - H (stretching)	- 3030	(v)
Aromatic substitution type (C-H out-of-plane bendings)		
Monosubstituted	690 - 710 and 730 - 770	(very s) (very s)
o - Disubstituted	735 - 770	(s)
m - Disubstituted	680 - 725 and 750 - 810	(s) (very s)
p - Disubstituted	800 - 840	(very s)
E. Alcohols, Phenols, Carboxylic Acids		
OH (alcohols, phenols, dilute solutions)	3590 - 3650	(sharp v)
OH (alcohols, phenols, hydrogen bonded)	3200 - 3550	(broad s)
OH (carboxylic acids, hydrogen bonded)	2500 - 3000	(broad v)
F. Aldehydes, Ketones, Esters and Carboxylic Acids		
C = O stretch - 1720 {	1720	
aldehydes	stre 2700 - 2900 1630 - 1780	(s)
ketones	1690 - 1740	(s)
esters	1680 - 1750	(s)
carboxylic acids	1735 - 1750	(s)
amides	1710 - 1780 1630 - 1690	(s) (s)
G. Amines		
N - H	3300 - 3500	(m)
H. Nitriles		
$\text{C} \equiv \text{N}$	2220 - 2260	(m)



TABLE - 2
Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)
1° Alkyl, RCH ₃	0.8 - 1.0
2° Alkyl, RCH ₂ R	1.2 - 1.4
3° Alkyl R ₃ CH	1.4 - 1.7
Allylic, R ₂ C = C - CH ₃ R	1.6 - 1.9
Benzylic, ArCH ₃	2.2 - 2.5
Alkyl chloride RCH ₂ Cl	3.6 - 3.8
Alkyl bromide, RCH ₂ Br	3.4 - 3.6
Alkyl iodide, RCH ₂ I	3.1 - 3.3
Ether, ROCH ₂ R	3.3 - 3.9
Alcohol, HOCH ₂ R	3.3 - 4.0
Ketone, RCCH ₃ O	2.1 - 2.6
Aldehyde, RCH O	9.5 - 9.6
Vinylic, R ₂ C = CH ₂	4.6 - 5.0
Vinylic R ₂ C = CH R	5.2 - 5.7
Aromatic, ArH	6.0 - 9.5
Acetylenic, RC \equiv CH	2.5 - 3.1
Alcohol hydroxyl, ROH	0.5 - 6.0 ^a
Carboxylic, RCOH O	10 - 13 ^a
Phenolic, ArOH	4.5 - 7.7 ^a
Amino R - NH ₂	1.0 - 5.0

^aThe chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE - 3

U.V. Absorption rules for diene chromophores

- 1) Parent 215 nm
- 2) Each extra conjugation 30 nm
- 3) Homoannular 39 nm
- 4) Exocyclic double bond 05 nm
- 5) Each alkyl (R) substituent directly attached to double bonded carbon 05 nm

- OH, - OR, Cl, Br 5 (nm)
- SR, (30 nm)
- NR₂ (60 nm)

U.V. Absorption rules for Enone System

- 1) Parent 215 nm
- 2) Each extra conjugation 30 nm
- 3) Homoannular 39 nm
- 4) Substituents
 - a) Alkyl group at α 10 nm
 - b) Alkyl group at β 12 nm
 - c) Alkyl group at γ, δ 18 nm

	α	β	γ
Cl	15	12	
OH, OR	35	30	
SR		85	
NR ₂		95	
O		75	
Acyl	6	6	6



Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
BOTANY (Special Paper – XI)
Genetics

Day and Date : Friday, 17-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **All questions carries equal marks.**
3) **Draw neat labelled diagrams wherever necessary.**
4) **Figures to the right indicate full marks.**

1. Rewrite the following sentences choosing correct alternative : **10**
- 1) Medelian Trait shows _____ pairs of contrasting characters.
a) 6 b) 7 c) 8 d) 9
 - 2) _____ coined the basic terminologies in genetics.
a) T. H. Morgan b) G. Mendel c) W. Bateson d) Watson
 - 3) Mendels law of independent assortment shows the phenotypic ration _____
a) 9 : 3 : 3 : 1 b) 9 : 3 : 4 c) 9 : 7 d) 13 : 3
 - 4) The pairing of homologues chromosomes is known as _____
a) Bivalent b) Tetravalent
c) Synapsis d) Terminalization
 - 5) The Sex Index (X/O) ratio produces 0.5 which results in _____
a) Female b) Super female
c) Male d) Super male
 - 6) Extrachromosomal inheritance is also called _____
a) Paternal inheritance
b) Maternal inheritance
c) Paternal and Maternal inheritance
d) None of these
 - 7) _____ genes are present on the nonhomologous parts of 'Y' chromosomes which pass on directly from father to son.
a) Digenic b) Diandric
c) Hologenic d) Holandric
 - 8) There are _____ types of blood groups.
a) 3 b) 4 c) 5 d) 6



9) The rotation of block of genes by 180° within chromosome is known as

- _____
- a) Inversion b) Deletion c) Translocation d) Duplication

10) The self incompatibility was firstly reported by _____ in Nicotiana tabacum.

- a) T. H. Morgan b) Bateson c) E. East d) Wiener

2. Answer **any five** of the following : **10**

- i) Define genetics.
- ii) Define linkage.
- iii) What is colour blindness ?
- iv) Define deletion.
- v) What is chiasma ?
- vi) What is the gene interaction ?

3. A) Answer **any two** of the following : **6**

- i) Explain the Mendel's Law of dominance.
- ii) Explain cytoplasmic inheritance with respect to plastid.
- iii) What are the types of duplication ?

B) Terminologies in genetics. **4**

4. Answer **any two** of the following : **10**

- i) What is the gene interaction ? Explain supplementary gene interaction with suitable example.
- ii) Write note on 'Hardy and Weinberg law'.
- iii) What are the multiple alleles ? Describe multiple alleles in eye-colour of *Drosophila*.

5. Answer **any two** of the following : **10**

- i) What is the crossing over ? Describe the mechanism of crossing over.
 - ii) What is the polyploidy ? Describe in brief types of polyploidy.
 - iii) Describe the sex-determination in man.
-



SLR-R – 229

Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
ZOOLOGY
Special Paper XI : Comparative Anatomy of Chordates

Day and Date : Friday, 17-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

Instructions: I) *All questions are compulsory.*
II) *Figures to the **right** indicate **full** marks.*
III) *Draw **neat** labelled diagrams **wherever** necessary.*

1. Select the appropriate answer from **each** of the following and rewrite the sentence. **10**

1) Uropygial glands are present in

- | | |
|-----------|---------------|
| a) Fishes | b) Mammals |
| c) Birds | d) Amphibians |

2) Amphibians possess _____ type of kidney.

- | | |
|----------------|-------------------|
| a) Pronephros | b) Mesonephros |
| c) Metanephros | d) Opisthonephros |

3) Sinus venosus is on the way of disappear once in _____ group of vertebrates.

- | | |
|--------------|--------------|
| a) Avian | b) Reptilian |
| c) Mammalian | d) Amphibian |

4) Lobi inferioris are present in brain of

- | | |
|------------------|-------------|
| a) Amphibians | b) Reptiles |
| c) Elasmobranchs | d) Mammals |

5) Axis vertebra of mammals is characterised by

- | | |
|----------------------|-------------------------|
| a) Procelous centrum | b) Amphicoelous centrum |
| c) Odontoid process | d) Deltoid process |

P.T.O.



4. Answer **any two** of the following. 10

- 1) Fore gut in birds.
- 2) Describe the mammalian glands.
- 3) Describe Respiratory organs in Reptiles.

5. Answer **any one** of the following. 10

- 1) Explain the evolution of aortic arches in vertebrates.
 - 2) Describe soft derivatives in vertebrates.
-



Seat No.	
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B.Sc. – I (Semester – I) (Old) Examination, 2015
STATISTICS (Paper – I)
Descriptive Statistics – I

Day and Date : Wednesday, 15-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory and carry equal marks.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative : **10**

- i) With the help of ogive curve, one can not determine.
a) median b) deciles c) percentiles d) mode
- ii) Attributes are measured using
a) Nominal scale b) Ordinal scale
c) Both a) and b) d) None of these
- iii) Median is
a) Most frequent value b) Minimum value
c) Middle most value d) None of these
- iv) The arithmetic mean of two numbers is 5 and their geometric mean is 4, then the numbers are
a) 8, 2 b) 7, 3 c) 15, – 2 d) None of these
- v) The formula for geometric mean is
a) $\frac{1}{n} \sum \log x$ b) $\log \left[\frac{1}{n} \sum x \right]$
c) $\text{anhlog} \left[\frac{1}{n} \sum \log x \right]$ d) None of these



- vi) An ideal measures of dispersion is
 - a) Range
 - b) Q.D
 - c) S.D
 - d) M.D

- vii) In order to compare the variability of different groups the best measure is
 - a) Range
 - b) S.D
 - c) C.V
 - d) None of these

- viii) If first order moments about 5 is 2 then the mean is equal to
 - a) 5
 - b) 2
 - c) 7
 - d) None of these

- ix) If $\beta_2 < 3$ then the curve is
 - a) Lepto Kurtic
 - b) Platty Kurtic
 - c) Meso Kurtic
 - d) None of these

- x) The first order moment about mean is
 - a) Zero
 - b) One
 - c) Variance
 - d) None of these

2. Answer **any five** of the following :

10

- i) Distinguish between qualitative and quantitative data.
- ii) What is frequency polygon ?
- iii) Define mean and median.
- iv) Define quartile deviation and mean deviation.
- v) Write a short note on Sheppard correction for moments.
- vi) Explain the term kurtosis with reference to a frequency curve.



3. A) Answer **any two** of the following : **6**
- i) Explain the construction of Histogram for grouped frequency distribution.
 - ii) What is the effect of change of origin and scale on arithmetic mean.
 - iii) Define moments about origin and mean prove that $\mu_2 = \mu_2' - \mu_1'^2$.
- B) State and prove minimal property of mean square deviation. **4**
4. Answer **any two** of the following : **10**
- i) Show that Bowley's coefficient of skewness lies between -1 and $+1$.
 - ii) For two positive observations a and b show that $Hm \leq Gm \leq Am$.
 - iii) If \bar{X}_1 and \bar{X}_2 are the means of two groups of sizes n_1 and n_2 respectively. Derive the formula to obtain mean of $(n_1 + n_2)$ values pooled together.
5. Answer **any one** of the following : **10**
- i) Define raw and central moments. Obtain the first four central moments in terms of raw moments.
 - ii) Derive the formula for mode for a grouped frequency distribution.
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Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
MATHEMATICS (Special Paper – XI)
Complex Analysis

Day and Date : Friday, 17-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Select correct alternative for each of the following : 10

i) The circle defined by $z = \cos t + i \sin t$, $0 \leq t \leq 2\pi$ is _____ curve.

- a) closed and simple b) closed but not simple
c) not closed but simple d) not closed and not simple

ii) If $f(z)$ is analytic at each point in the some neighbourhood of $z = z_0$, then the point $z = z_0$ is called _____ of a function $f(z)$.

- a) removable singularity
b) isolated singularity
c) isolated essential singularity
d) none of these

iii) Polar form of Cauchy-Riemann equations is

- a) $\frac{\partial u}{\partial r} = r \frac{\partial v}{\partial \theta}$, $-r \frac{\partial u}{\partial \theta} = \frac{\partial v}{\partial r}$
b) $\frac{1}{r} \frac{\partial u}{\partial r} = \frac{\partial v}{\partial \theta}$, $r \frac{\partial v}{\partial r} = -\frac{\partial u}{\partial \theta}$
c) $r \frac{\partial u}{\partial r} = \frac{\partial v}{\partial \theta}$, $\frac{\partial u}{\partial \theta} = -r \frac{\partial v}{\partial r}$
d) none of these



iv) The complex integral of $f(z)$ along L has the property

a) $\left| \int_L f(z) dz \right| = \int_L |f(z)| |dz|$ b) $\left| \int_L f(z) dz \right| \geq \int_L |f(z)| |dz|$

c) $\left| \int_L f(z) dz \right| < \int_L |f(z)| |dz|$ d) $\left| \int_L f(z) dz \right| \leq \int_L |f(z)| |dz|$

v) If a closed interval $[a, b]$ is divided into n subintervals by inserting $n - 1$ intermediate points satisfying $a = t_0 < t_1 < \dots < t_{n-1} < t_n = b$, then the set $P = \{t_0, t_1, \dots, t_n\}$ is called _____ of the interval $[a, b]$.

- a) Partition b) Norm
c) Contour d) None of these

vi) The residue at $z = a$ is the coefficient of _____ in the expansion of $f(a + t)$.

- a) $\frac{1}{t - a}$ b) $\frac{1}{t}$
c) $\frac{1}{t + a}$ d) None of these

vii) Residue at infinity is $-\frac{1}{2\pi i} \int_C f(z) dz$ where integral along C is performed in _____ direction.

- a) Straight line b) Clockwise
c) Anti-clockwise d) None of these

viii) If $f(z)$ is regular except at finite number of poles within closed contour C and continuous on the boundary of C then $\int_C f(z) dz =$ _____ where R is residues of $f(z)$ at its poles.

- a) $2\pi \Sigma R$ b) $2\pi \Sigma R^2$
c) $2\pi i \Sigma R^2$ d) $2\pi i \Sigma R$



ix) The value of the complex integral $\int_L dz$ where L is a closed rectifiable arc is

- a) Zero
- b) One
- c) Finite
- d) Infinity

x) Laplace's equation is

- a) $\frac{\partial^2 \phi}{\partial x^2} = \frac{\partial^2 \phi}{\partial y^2}$
- b) $\frac{\partial^2 \phi}{\partial x^2} = -\frac{\partial^2 \phi}{\partial y^2}$
- c) $\frac{\partial \phi}{\partial x} = \frac{\partial \phi}{\partial y}$
- d) $\frac{\partial \phi}{\partial x} = -\frac{\partial \phi}{\partial y}$

2. Attempt **any five** of the following :

10

- a) Show that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ is harmonic.
- b) If $f(z)$ and $g(z)$ are analytic functions in a domain D, then prove that

$$\frac{d}{dz} \left[\frac{f(z)}{g(z)} \right] = \frac{g(z) \frac{d}{dz} [f(z)] - f(z) \frac{d}{dz} [g(z)]}{[g(z)]^2}, g(z) \neq 0.$$

- c) Define Laurent's series for analytic function $f(z)$ in the ring shaped region D bounded by two concentric circles.
- d) Find the poles and their orders for the function given by

$$f(z) = \frac{z^2 + 1}{(z - 1)(z - 3)(z - 4)^2(z - 5)^3}.$$

- e) Expand $\sin z$ in a Taylor's series about $z = 0$.
- f) Evaluate $\int_C \frac{1}{z} dz$ along the arc of circle $|z| = 1$ from -1 to $+1$ above the axis.

3. A) Attempt **any two** of the following :

6

- a) Expand $f(z) = \frac{z + 3}{z^3 - z^2 - 2z}$ in a Laurent's series valid for the regions $|z| < 1$, $1 < |z| < 2$ and $|z| > 2$.
- b) State and prove Cauchy-Riemann equations in polar form.
- c) Find the analytic function of which real part is $e^{-x}[(x^2 - y^2) \cos y + 2xy \sin y]$.

B) Prove that $\int_0^\pi \frac{a d\theta}{a^2 + \sin^2 \theta} = \frac{\pi}{\sqrt{1 + a^2}}, a > 0.$

4



4. Attempt **any two** of the following : **10**
- a) State and prove Cauchy's fundamental theorem.
 - b) For what values of z do the function w defined by $z = \sinh u \cos v + i \cosh u \sin v$ cease to be analytic ?
 - c) Find the residue of $\frac{1}{(z^2 + 1)^3}$ at its pole.
5. Attempt **any one** of the following : **10**
- a) State and prove Cauchy's residue theorem.
 - b) Show that the continuous single valued function $f(z)$ is analytic in the domain D , if four partial derivatives u_x, u_y, v_x, v_y exists and continuous and satisfy Cauchy-Riemann equations at each point of the domain D .
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B.Sc. III (Semester – V) Examination, 2015
STATISTICS (Special Paper – XI)
Probability Distributions and Stochastic Process

Day and Date : Friday, 17-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Use of scientific calculators is allowed.**
3) **Use of statistical tables is allowed.**
4) **Figures to the right indicate full marks.**

1. Select the most correct alternative.

10

i) In Markov chain state j is said to be accessible from state i if

- a) $P_{ij}^{(n)} = 0$ b) $P_{jj}^{(n)} = 0$ c) $P_{ij}^{(n)} > 0$ d) None of these

ii) If $X \sim B(1, P)$. Suppose X is truncated at $X = 0$ then $V(X) =$

- a) 1 b) 0 c) pq d) None of these

iii) If the support of r.v. X is (a, b) and if it is truncated below $a + 5$, then it is allowed to take values in the interval

- a) $(-\infty, a)$ b) (a, b) if $a + 5 < b$
c) (a, b) if $a + 5 > b$ d) $(0 \text{ to } a + 5)$

iv) If $(X, Y) \sim BN(0, 0, 1, 1, \rho)$ then range of $E(Y | X = 1)$ is

- a) 0 to 1 b) $-\infty$ to 0 c) 0 to ∞ d) -1 to 1

v) For Laplace (μ, λ) distribution

- a) $\beta_1 = 0, \beta_2 = 3$ b) $\beta_1 > 0, \beta_2 = 6$
c) $\beta_1 = 0, \beta_2 = 6$ d) $\beta_1 < 0, \beta_2 = 3$



vi) If $X \sim \text{Laplace}(0, 1)$ and if $X < 0$ then $P(X \leq x) =$

- a) $\frac{1}{2}e^x$ b) $\frac{1}{2}e^{-x}$ c) e^x d) e^{-x}

vii) If $X \sim C(0, 1)$ then $V(x) =$

- a) 0.5 b) 1 c) 1.5 d) does not exist

viii) If $X \sim \text{log normal}(\mu, \sigma^2)$ then

- a) β_1 increases with μ
 b) β_1 decreases with μ
 c) β_1 increases with μ if $\mu > 0$ and β_1 decreases with μ if $\mu < 0$
 d) β_1 does not depend upon the value of μ

ix) If state 3 is absorbing state then $P_{32} =$

- a) 1 b) 0 c) less than 1 d) 0.5

x) If X_1, X_2, \dots, X_n are iid $C(1, 1)$ r.v.s then the distribution of sample mean

$$\bar{X} = \frac{1}{n} \sum X_i \text{ is}$$

- a) $C(n, n)$ b) $C(1, n)$ c) $C(n, 1)$ d) $C(1, 1)$

2. Attempt **any five** from the following.

10

- a) If $(X, Y) \sim \text{BN}(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$. Write the expression for $E(Y | X = K)$.
- b) Write down the pdf of Laplace distribution with parameters μ and λ .
- c) Sketch the probability curve of Cauchy distribution.
- d) Give the example of a stochastic process with discrete state space and discrete parameter space.
- e) If $X_1, X_2, X_3, X_4, X_5, X_6$ are iid $N(0, 1)$ random variables then state the distribution of $\frac{X_1}{X_6} + \frac{X_2}{X_5} + \frac{X_3}{X_4}$ and identify the parameters.
- f) Define Stochastic matrix.



3. A) Attempt **any two** from the following. 6
- i) State the cdf of Cauchy (μ, λ) distribution and find t such that $P(X \leq t) = 0.25$.
 - ii) If (X, Y) is a bivariate normal r.v. with
$$f(x, y) = C \cdot \exp \left[\frac{-1}{2(1-\rho^2)} (x^2 - 2\rho xy + y^2) \right]$$
 then i) find C ii) $E(Y)$ iii) $V(Y)$.
 - iii) Write the pdf of truncated normal distribution, truncated above b and state its mean.
- B) Define lognormal distribution and prove its relationship with normal distribution. 4
4. Answer **any two** from the following. 10
- A) A certain community is served by 3 free local newspapers. Each month people have a choice of receiving one of the 3 papers. Of those who receive newspaper-1 each month, 30% switch to newspaper-2 and 20% to newspaper -3. Of those who receive newspaper – 2 each month, 10% switch to newspaper – 1 and 25% to newspaper 3. Of those who receive newspaper – 3 each month, 15% switch to newspaper – 1 and 30% switch to newspaper – 2. If 50% homes receive newspaper – 1, 35% receive newspaper – 2 and remaining are receiving newspaper – 3, what percentage will receive newspaper 3 one month from now ?
- B) If $X \sim \text{lognormal}(\mu, \sigma^2)$ find its cdf.
- C) If X, Y are iid normal $(0, 1)$ r.v.s find the distribution of $u = \frac{X}{Y}$.
5. Attempt **any two** from the following. 10
- A) Obtain mgf of Laplace (μ, λ) distribution.
- B) Find mgf of bivariate normal distribution with parameters $\mu_x, \mu_y, \sigma_x^2, \sigma_y^2$ and ρ .
- C) Find cdf of $C(0, 1)$ distribution and hence find its quartile deviation.
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Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
MICROBIOLOGY
Agricultural Microbiology (Special Paper – XI)

Day and Date : Friday, 17-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by selecting correct answer from given alternatives.

10

- i) The end product of degradation of organic nitrogen is _____
a) Peptides b) Amino acids c) Proteins d) All of these
- ii) The size of sand particles ranges from _____ mm.
a) 0.05 – 2.00 b) 0.001 – 0.01
c) 2.00 – 4.00 d) 4.00 – 5.00
- iii) For composting optimum C : N ratio required is _____
a) 10 : 20 b) 20 : 30 c) 30 : 40 d) 40 : 50
- iv) Ustilago Scitaminea causes _____ disease in plants.
a) Soft rot of potato b) Oily spot on pomegranate
c) Whip smut of sugarcane d) None of these
- v) Harizon 'A' of soil consists of _____
a) Organic matter and mineral particles
b) Fine and mineral particles
c) Wheathered rocks
d) Unwheathered rocks
- vi) The native cellulose molecules are attacked by _____ enzyme.
a) C_x b) C₁ c) Glucanase d) Glucocellulases
- vii) _____ composting material is obtained through the agency of earthworms.
a) Might soil b) FYM c) Green manure d) Vermi



viii) The conversion of nontoxic substance to a toxic product by microorganism in soil is by _____ reaction.

- a) Activation b) Diffusion c) Detoxification d) Degradation

ix) Vanillic acid is a product formed after the degradation of _____

- a) Cellulose b) Hydrocarbons
c) Lignin d) Pesticides

x) _____ group of organisms dominate in soil.

- a) Bacteria b) Actinomycetes
c) Fungi d) Yeasts

2. Answer **any five** of the following :

10

- i) List two pesticide degrading organisms in soil.
- ii) What is solubilization of phosphorous ?
- iii) List major groups of microorganisms in soil.
- iv) What is compost ? Give one example of compost.
- v) What is ammonification ?
- vi) List two organisms involved in methane oxidation.
- vii) Explain soil horizons.

3. A) Answer the questions in brief (**any two**) :

6

- i) Degradation of aromatic hydro carbons.
- ii) Explain in short nitrogen cycle.
- iii) Describe in detail control measures of plant diseases.

B) Write in detail biodegradation of lignin.

4

4. Answer **any two** of the following :

10

- i) Explain in detail process of vermicomposting.
- ii) Write in brief biodegradation of pesticides.
- iii) Explain in detail production of green manures.

5. Answer **any two** of the following :

10

- i) Write about applications of biotechnology in agriculture.
 - ii) Explain biochemistry involved in cellulose degradation.
 - iii) Write on role of microorganisms in carbon cycle.
-



4. Answer **any two** (five marks each)

10

- i) Explain the pin structure of 8255 PPI.
- ii) Write a program to read PORT-1 data and send it serially at 9600 baud rate continuously in mode-1. Assume crystal frequency to be 11.0592 MHz.
- iii) Explain the interfacing of 16x2 LCD to μ C 89V51. Write programming steps or draw flowchart to display "My India".

5. Answer **any one** :

10

- A) Explain the interfacing of stepper motor using ULN 2003. Write a program to rotate the motor in clockwise or in anticlockwise direction.
 - B) Explain the interfacing of RAM 6264 to μ C89V51. Discuss the memory map.
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Seat No.	
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**B.Sc. – III (Semester – V) Examination, 2015
COMPUTER SCIENCE (Special Paper – XI)
Operating System – I**

Day and Date : Friday, 17-4-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **All questions are equal marks.**
3) **Calculator is not allowed.**

1. Choose the correct answer : 10
- 1) _____ is an example of distributed system.
 - a) client server system
 - b) clustered system
 - c) multiprocessor system
 - d) none of these
 - 2) The command interpreter acts as an interface between
 - a) User and CPU
 - b) CPU and I/O devices
 - c) CPU and Secondary devices
 - d) Two different devices
 - 3) Compaction is a solution for
 - a) Internal fragmentation
 - b) External fragmentation
 - c) Both a) and b)
 - d) None of these
 - 4) _____ is used for deadlock avoidance if we have only on instance of each resource type.
 - a) Bankers algorithm
 - b) Safety algorithm
 - c) Resource allocation graph
 - d) None of these
 - 5) Out of the four necessary conditions _____ must hold simultaneously for a deadlock to occur.
 - a) 1
 - b) 2
 - c) 3
 - d) 4
 - 6) The critical section problem is a problem faced by
 - a) User process
 - b) O.S. process
 - c) Co-operating system process
 - d) None of these



- 7) An I/O bound program has
- | | |
|-------------------------------|------------------------------|
| a) few very small I/O bursts | b) few very big I/O bursts |
| c) many very short CPU bursts | d) many very long CPU bursts |
- 8) The O.S. provides the mechanism of _____ for processes.
- | | |
|-----------------------------|----------------------------|
| a) creation and termination | b) editing and compilation |
| c) execution | d) none of these |
- 9) SJF is a special case of
- | | |
|-----------------------|-----------------------------|
| a) priority algorithm | b) preemptive algorithm |
| c) FCFC | d) non-preemptive algorithm |
- 10) The *dining* philosopher problem is an example of
- | | |
|----------------------------------|-----------------------------|
| a) memory management system | b) critical section problem |
| c) free space allocation problem | d) none of these |

2. Answer **any five** of the following : **10**
- 1) What are the types of client server systems ?
 - 2) What are scheduler ?
 - 3) What are binary semaphore ?
 - 4) What is threads ?
 - 5) What is swapping ?
 - 6) Which are the methods the deadlock by killing process can be utilized ?
3. A) Answer **any two** of the following : **6**
- 1) Explain deadlock prevention.
 - 2) Explain batch operating system.
 - 3) Write note on layered system.
- B) Explain page replacement algorithms. **4**
4. Answer **any two** of the following : **10**
- 1) What is deadlock ? Explain deadlock recovery.
 - 2) Explain classic problem of synchronization.
 - 3) Explain services provided by operating system.
5. Answer **any two** of the following : **10**
- 1) Explain SJF.
 - 2) Write note on paging.
 - 3) Explain critical section problems.
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Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
PHYSICS (Special Paper – XII)
Electrodynamics

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**
4) **Use of calculator or log tables is allowed.**

1. Select the correct alternative :

10

- i) The relations between electric field and magnetic field is established by _____
a) Maxwell b) Newton c) Ohm d) Kirchhoff
- ii) Laplace's equation is applicable to _____
a) region with certain charge distribution
b) region with uniform charge distribution
c) charge free region
d) both a) and b)
- iii) The trajectory of a particle entering an electric field in a direction perpendicular to \vec{E} is _____
a) straight line parallel to \vec{E} b) parabola
c) circle d) helix
- iv) Generation of motional emf is the principle of _____
a) generator b) battery
c) voltaic cell d) photovoltaic cell
- v) Mutual inductance is measured in _____
a) Farad b) Ohm
c) Weber d) Henry



vi) The displacement current density in a dielectric medium is _____

a) $\frac{\partial \bar{D}}{\partial t} = 0$

b) $\frac{\partial \bar{D}}{\partial t} = \epsilon_0 \frac{\partial \bar{E}}{\partial t}$

c) $\frac{\partial \bar{D}}{\partial t} = \bar{P} + \epsilon_0 \frac{\partial \bar{E}}{\partial t}$

d) $\frac{\partial \bar{D}}{\partial t} = \frac{1}{\epsilon_0} \frac{\partial \bar{E}}{\partial t}$

vii) The nature of electromagnetic wave is _____

a) longitudinal

b) stationary

c) transverse

d) all a), b) and c)

viii) When a wave gets reflected from the surface of a denser medium, there occurs a phase change of _____

a) 0°

b) 60°

c) 90°

d) 180°

ix) The expression for critical angle of incidence is given by $\theta_c = \text{Sin}^{-1} \left(\frac{n_2}{n_1} \right)$

where, _____

a) $n_2 > n_1$

b) $n_1 > n_2$

c) $n_1 = n_2$

d) $n_1 \cong n_2$

x) Total power radiated by electric dipole is proportional to _____

a) frequency

b) square of frequency

c) square root of frequency

d) forth power of frequency

2. Answer **any five** of the following :

10

1) Write down Poisson's equation with meaning of each term.

2) Define self inductance of a coil.

3) Define current density \vec{J} .

4) State the principle of transformer.

5) What is transmission coefficient of electromagnetic wave ?

6) Define retarded time.



3. A) Answer **any two** of the following : **6**
- 1) Define emf and obtain expression for motional emf.
 - 2) State and discuss Ampere's law.
 - 3) Considering Maxwell's equations in vacuum, find out wave equations and wave velocity equation.
- B) Find the transmission coefficient for normal incidence at glass-air interface.
Given : Refractive index of glass = 1.5 and refractive index of air = 1.0. **4**
4. Answer **any two** of the following : **10**
- 1) Obtain an expression for self inductance of a straight conductor due to field inside it.
 - 2) Write note on Biot-Savarts law.
 - 3) Explain total internal reflection of em waves.
5. Answer **any one** of the following : **10**
- 1) State Maxwells equations for vacuum and explain the physical significance of each equation.
 - 2) Discuss the trajectory of a charged particle entering a uniform magnetic field (\vec{B}), such that its initial velocity is perpendicular to \vec{B} .
-



SLR-R – 237

Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
CHEMISTRY (Special Paper – XII)
Analytical and Industrial Physical Chemistry

Day and Date : Saturday, 18-4-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** diagrams and give equations **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative from among those given below and rewrite the sentence :

10

1) The unit of cell constant is

- a) cm
b) cm^{-1}
c) m
d) μm

2) _____ is used as a anode in aluminium anodising.

- a) Cr
b) Pb
c) Al
d) Ni

3) The molecular formula of quinhydrone is

- a) $\text{C}_6\text{H}_4(\text{OH})_2 \cdot \text{C}_6\text{H}_4(\text{OH})_2$
b) $\text{C}_6\text{H}_4\text{O}_2 \cdot \text{C}_6\text{H}_4(\text{OH})_2$
c) $\text{C}_6\text{H}_4\text{O}_2 \cdot \text{C}_6\text{H}_4\text{O}_2$
d) None of these

4) In electroplating current density is usually expressed in

- a) A/dm^2
b) $\text{A}\cdot\text{dm}^2$
c) $\text{A}\cdot\text{cm}^2$
d) $\text{A}\cdot\text{m}^3$

5) For flame photometry _____ sample can be used.

- a) solid
b) gas
c) liquid
d) all of these

P.T.O.



3. A) Answer **any two** of the following : **6**
- i) What are the limitations of flame photometry ?
 - ii) Explain the terms :
 - a) Opacity
 - b) Molar extinction coefficient.
 - iii) What is electrolysis ? State first and second law of electrolysis.
- B) Mention different types of burners used in flame photometry. Explain one of them. **4**
4. Answer **any two** of the following : **10**
- i) What do you mean by conductometric titrations ? Discuss graphically the titration between strong acid and strong base.
 - ii) Write a note on analytical methods for locating end points.
 - iii) With the help of block diagram, explain various parts involved in flame photometer.
5. Answer **any two** of the following : **10**
- i) Describe in detail anodising process.
 - ii) Write a note on circuit of direct reading potentiometer.
 - iii) Discuss applications of flame photometry.
-



Seat No.	
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B.Sc. (Part – III) (Semester – V) Examination, 2015
BOTANY (Special Paper – XII)
Plant Biochemistry

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

Instructions : i) Figures to the **right** indicate **full** marks.
ii) Draw **neat** labelled diagrams **wherever** necessary.

1. Rewrite the sentence by choosing proper answer 10
- i) _____ are the polyhydroxy alcohols or polyhydroxy ketones.
a) Carbohydrates b) Nucleic acids c) Proteins d) Lipids
- ii) Monosaccharides containing six carbon atoms are called as _____
a) Trioses b) Tetroses c) Pentoses d) Hexoses
- iii) _____ is formed of two molecules of glucose.
a) Sucrose b) Lactose c) Maltose d) Xylose
- iv) Lipids are formed by a chemical reaction between _____
a) Two glucose molecules
b) A glycerol molecule and three fatty acid molecules
c) Three glycerol molecules and one fatty acid molecule
d) A glycerol molecule and three amino acid molecules
- v) _____ is a saturated fatty acid.
a) Palmitic acid b) Oleic acid c) Linoleic acid d) Linolenic acid
- vi) _____ are simple lipids
a) Fats b) Glycolipids c) Phospholipids d) All of these
- vii) _____ is synthesized from oxaloacetate by transamination of glutamate.
a) Aspartic acid b) Arginine c) Alanine d) Proline



SLR-R – 239

Seat No.	
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**B.Sc. (Part – III) (Semester – V) Examination, 2015
ZOOLOGY (Special Paper – XII)
Developmental Biology**

Day and Date : Saturday, 18-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw neat labelled diagrams wherever necessary.*

1. Select appropriate answer from **each** of the following and rewrite the sentences : **10**

- 1) The egg of Amphioxus is termed as _____ egg.
 - a) microlecithal
 - b) megalecithal
 - c) macrolecithal
 - d) polylecithal
- 2) The smallest spermatozoan is found in
 - a) chick
 - b) amphioxus
 - c) frog
 - d) human
- 3) The cleavage in Amphioxus is
 - a) meroblastic
 - b) discoidal
 - c) holoblastic
 - d) superficial
- 4) In chick hatching occurs after about _____ days.
 - a) 21
 - b) 28
 - c) 35
 - d) 42
- 5) The broad end of hen's egg shows presence of
 - a) air-space
 - b) albumen
 - c) yolk
 - d) water
- 6) Main function of Allantois is storage of _____ in chick.
 - a) glycogen
 - b) lipid
 - c) yolk
 - d) excretory product
- 7) Major nutritive foetal membrane in chick embryo is
 - a) amnion
 - b) allantois
 - c) yolk sac
 - d) chorion
- 8) _____ egg is found in insects.
 - a) Centrolecithal
 - b) Polylecithal
 - c) Microlecithal
 - d) Megalecithal

P.T.O.



- 9) Chalazae in hen's egg are useful for
- a) development of ectoderm
 - b) development of mesoderm
 - c) development of endoderm
 - d) to keep the ovum in centre
- 10) The process in which non-motile spermatids are converted into motile sperms is called
- a) Spermeogenesis
 - b) Gametogenesis
 - c) Spermatogenesis
 - d) Oogenesis

2. Answer **any five** of the following : **10**
- i) Sperm of chick
 - ii) Non-cleidoic egg
 - iii) Radial cleavage
 - iv) Yolk
 - v) Fertilization membrane
 - vi) Organizer.
3. A) Answer **any two** of the following : **6**
- i) Shell of hen's egg
 - ii) Telolecithal egg
 - iii) Amnion.
- B) Surrogate mother. **4**
4. Answer **any two** of the following : **10**
- i) Spermatogenesis
 - ii) Blastula of amphioxus
 - iii) Types of eggs according to the amount of yolk.
5. Answer **any one** of the following : **10**
- i) Describe structure of 24 hrs. chick embryo.
 - ii) What is placenta ? Describe different types of placenta.
-



Seat No.	
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B.Sc. – I (Semester – I) (Old) Examination, 2015
ZOOLOGY (Paper – I)
Animal Diversity – I

Day and Date : Wednesday, 15-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N.B. : 1) **Draw** neat labelled diagrams **wherever** necessary.
2) Figures to **right** indicate marks.

1. Select the appropriate answer for **each** of the following and complete the sentence :

10

- 1) Earthworm belongs to Phylum _____
 - a) Porifera
 - b) Coelenterata
 - c) Annelida
 - d) Platyhelminthes
- 2) Cyclosis in Paramecium is related with _____
 - a) Digestion and circulation
 - b) Reproduction
 - c) Excretion
 - d) None of the above
- 3) Spicules of Sycon are secreted by _____ cells.
 - a) Scleroblast
 - b) Archaeocyte
 - c) Pinocytosis
 - d) Leucocyte
- 4) In Hydra feeding takes place with _____
 - a) Pedal disc
 - b) Tentacles
 - c) Bud
 - d) Substratum
- 5) The scolex of tapeworm having _____ suckers.
 - a) One
 - b) Two
 - c) Three
 - d) Four
- 6) Earthworm performs locomotion with _____
 - a) Setae
 - b) Spermathecae
 - c) Nepridia
 - d) Prostomium
- 7) Human is _____ host of tapeworm.
 - a) Secondary
 - b) Intermediate
 - c) Primary
 - d) Tertiary

P.T.O.



- 8) In earthworm septal nephridia are organs for _____
a) Locomotion b) Digestion c) Excretion d) Reproduction
- 9) In paramecium binary fission is _____ reproduction.
a) Asexual b) Sexual c) Conjugation d) Budding
- 10) Body of Hydra shows _____ layers.
a) One b) Two c) Three d) Four

2. Write short notes on **(any five)** : **10**
- i) Salient features of Annelida.
 - ii) Tentacles of Hydra.
 - iii) Gland cells of Hydra.
 - iv) Setae of earthworm.
 - v) Archaeocytes of sycon.
 - vi) Intracellular digestion in Hydra.
3. A) Answer **any two** of the following : **6**
- i) Spermatheca of earthworm.
 - ii) Nuclear apparatus of paramecium.
 - iii) Scolex of tapeworm.
- B) Contractile vacuoles in Paramecium **4**
4. Solve **any two** of the following **10**
- i) Morphological adaptations in tapeworm.
 - ii) Sexual reproduction in Hydra.
 - iii) Septal nephridium of earthworm.
5. Answer **any one** of the following : **10**
- i) Describe the digestive system of earthworm.
 - ii) Describe different types of locomotion in Hydra.
-



Seat No.	
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B.Sc. III (Semester – V) Examination, 2015
MATHEMATICS (Special Paper – XII)
Programming in C

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m to 5.00 p.m.

Max. Marks : 50

Instructions : 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Select the correct alternative for **each** of the following : **10**
- 1) 'C' language was developed by
 - a) Martin Ricards
 - b) Dennis Ritchie
 - c) Ken Thomson
 - d) Kernighan
 - 2) _____ escape sequence character causes the cursor to move to the next line.
 - a) \t
 - b) \a
 - c) \n
 - d) /n
 - 3) _____ is the smallest part of C program.
 - a) Token
 - b) Function
 - c) Macro
 - d) Character
 - 4) In the C language, a constant can be
 - a) number
 - b) character
 - c) string
 - d) all of the above
 - 5) The _____ is a compile time operator.
 - a) sizeof
 - b) comma operator
 - c) bitwise operator
 - d) none of these
 - 6) For using character functions, we must include the header file _____ in the program.
 - a) <stdio.h>
 - b) <stdlib.h>
 - c) <ctype.h>
 - d) <math.h>



- 7) _____ is the multi way decision making statement.
a) goto b) switch c) if d) for
- 8) The _____ is an exit controlled loop statement.
a) for b) while c) do-while d) none of these
- 9) An array that uses more than two subscript is referred to as _____ array.
a) one dimensional b) two dimensional
c) multidimensional d) none of these
- 10) By default the C function returns _____ value.
a) character b) float c) double d) integer

2. Attempt **any five** of the following :

10

- What does int main (void) ?
- Draw the block diagram of C TOKENS.
- Explain the assignment operator.
- What is the purpose of scan f() function ?
- Explain relational operators.
- What is arrays ? List the types of arrays.

3. A) Attempt **any two** of the following :

6

- Write a note on basic structure of C programs.
- Explain user-defined functions with examples.
- Write C assignment statements to evaluate the following equations :
 - $A = \pi r^2 + 2\pi rh$
 - $S = \sqrt{a^2 + b^2 - 2ab \cos(x)}$
 - $C = x^3 + bx^2 + ax + d$

B) Explain increment and decrement operators in C.

4



4. Attempt **any two** : 10

- a) Explain the do statement with flow chart.
- b) Explain If-Else statement.
- c) Write a 'C' program to find the sum and average of given 'n' numbers.

5. Attempt **any one** of the following : 10

- a) Describe the form of the C functions.
- b) Write a C program to find the solution of the equation $ax^2 + bx + c = 0; a \neq 0$.



Seat No.	
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B.Sc. – III (Semester – V) Examination, 2015
STATISTICS – (Special Paper – XII)
Operations Research and Applied Statistics

Day and Date : Saturday, 18-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** i) **All questions are compulsory.**
ii) **Use of simple or scientific calculator is allowed.**
iii) **Figures to the right indicate full marks.**

1. Select most correct alternative. 10
- i) In maximization L.P.P., if atleast one artificial variable is in the basis, but not at zero level and all net-evaluations are non-negative then we have
- a) feasible solution b) no feasible solution
c) an unbounded solution d) an optimum solution
- ii) If a negative value appears in the solution values of X_B column of the simplex method, then the basic solution is
- a) optimum b) infeasible c) unbounded d) all of these
- iii) The transportation problem deals with the transportation of
- a) a single product from several sources to a destination
b) a single product from several sources to several destinations
c) a multi-product from several sources to several destinations
d) a single product from a source to several destinations
- iv) An assignment problem can be
- a) designed and solved as a transportation problem
b) of maximization type
c) solved only if number of rows equals the number of columns
d) all of these



- v) In the context of network, which of the following is not correct ?
- a) A network is the graphic representation of activities and nodes
 - b) An arrow diagram is essentially a closed network
 - c) An arrow representing an activity may not have a length and shape
 - d) A project network cannot have multiple initial and final nodes
- vi) In critical path analysis, the word CPM mean
- a) Critical Path Method
 - b) Crash Project Management
 - c) Critical Project Management
 - d) Critical Path Management
- vii) When the lot contains all defectives, the OC function for $p = 1$ is
- a) $L(p) = 1$
 - b) $L(p) = 0$
 - c) $L(p) = \infty$
 - d) none of these
- viii) A curve showing the probability of accepting a lot of quality p is known as
- a) OC curve
 - b) ASN curve
 - c) Compertz curve
 - d) none of these
- ix) The probability of rejecting a lot having \bar{p} as the process average fraction defective is known as
- a) consumer's risk
 - b) type II error
 - c) producer's risk
 - d) none of these
- x) Given a system of m simultaneous linear equations in n unknowns ($m < n$), the number of non-basic variables will be
- a) m
 - b) n
 - c) $n - m$
 - d) $n + m$

2. Answer **any five** of the following :

10

- i) Define an optimum solution of L.P.P.
- ii) Define a slack variable.
- iii) What is a Balanced Assignment Problem ?
- iv) Define a Transportation Problem.
- v) Define Consumer's risk.
- vi) Define most likely time in a PERT.



3. A) Answer **any two** of the following : 6
- i) Give the mathematical form of an Assignment problem.
 - ii) Define basic feasible solution of a L.P.P. When it is said to be degenerate ?
 - iii) Define critical activities and critical path.

B) For a single sampling plan with lot size N, n = 20, c = 1 and p = 0.01, find the probability of rejection of the lot. 4

4. Answer **any two** of the following : 10

- i) Write a procedure of Graphical Method of solving a L.P.P.
- ii) Explain method of Matrix minima.
- iii) A project schedule has the following activities and the time (in months) of completion of each activity :

Activity	1- 2	2 - 3	3 - 5	2 - 4	4 - 5
Time	8	4	5	6	2

Draw network diagram and find the minimum completion time of the project.

5. Answer **any two** of the following : 10

- i) Find IBFS to the following LPP and test whether it is an optimum by using suitable method.

$$\begin{aligned} \text{Max } z = & x_1 + x_2 \\ \text{s.t. } & x_1 + x_2 \leq 1 \\ & -3x_1 + x_2 \geq 3 \\ & x_1 \geq 0, x_2 \geq 0 \end{aligned}$$

- ii) Find IBFS to the following transportation problem by using North-West Corner Method and test whether it is a degenerate.

		To			
		A	B	C	Availability
From	I	50	30	220	1
	II	90	45	170	3
	III	250	200	50	4
Requirement		4	2	2	

- iii) Write a procedure of Double Sampling Plan.
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Seat No.	
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B.Sc. (Part – III) (Sem. – V) Examination, 2015
GEOLOGY (Special Paper – XII)
Hydrogeology and Remote Sensing

Day and Date : Saturday, 18-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

1. Write the correct answer from the given options : 10
- 1) Specific yield is least in
a) Gravel b) Sand c) Silt d) Clay
 - 2) _____ aquifers are underlain by voluminous unconsolidated rock material and occur bordering mountains.
a) Intermonate valleys b) 'V' shaped valleys
c) Abandoned valleys d) Plains
 - 3) _____ is the poor aquifer.
a) Basalt b) Granite c) Sandstone d) Limestone
 - 4) _____ is an impermeable formation which may contain water but is incapable of transmitting significant water quantities.
a) Aquiclude b) Aquifuge c) Aquifer d) Aquitard
 - 5) Lost rivers are found in _____ terrain.
a) Alluvium b) Limestone
c) Sandstone d) Vesicular basalt
 - 6) IRS is a _____ platform.
a) Polar b) Air borne c) Geostationary d) Moon
 - 7) The centre of an air photograph is known as
a) Fiducial mark b) Principal point
c) Central point d) Nadir point



8) _____ defect is produced by the wind current across the flight path during aerial photography.

- a) Drift b) Crab c) Tilt d) Oblique

9) The wavelength width of reflected photographic IR is _____ μ m.

- a) 0.3 to 0.4 b) 0.7 to 0.9 c) 0.4 to 0.9 d) 0.3 to 0.9

10) Image of granite terrain show _____ drainage pattern.

- a) Trellises b) Radial c) Dendritic d) Barbed

2. Write **any five** of the following : **10**

- a) Air photographs.
- b) Imagery.
- c) Passive sensor.
- d) Watertable.
- e) Primary and secondary porosity.
- f) Leaky aquifer.

3. A) Attempt **any two** of the following : **6**

- a) Hydrologic cycle.
- b) Vertical distribution of groundwater.
- c) Importance of remote sensing in geology.

B) Mirror stereoscope. **4**

4. Describe **any two** of the following : **10**

- a) Tone, pattern and shadow as elements of photo-recognition.
- b) Types of air photographs based on film.
- c) Concept of remote sensing.

5. Explain **any two** of the following : **10**

- a) Types of aquifers.
 - b) Permeability and transmissivity.
 - c) Springs and their types.
-



vi) Human body has millions of different antibodies for detecting millions of different antigens because _____

- a) Body has millions of different antibody genes
- b) Antibody genes undergo somatic rearrangement and somatic mutation
- c) Antibody genes undergo antigen shifting
- d) None of these

vii) Degranulation of _____ result into production of vasoactive amines like histamines.

- a) Mast cells
- b) Macrophage
- c) Platelets
- d) Lymphocytes

viii) Cytokines _____

- a) are lymphokines
- b) are monokines
- c) help to control and regulate immune response
- d) all of these

ix) Which one of the following is not included in National Immunization Program of India ?

- a) Polio
- b) Tuberculosis
- c) Rabies
- d) Diphtheria

x) After the contact with foreign antigens, body produces specific antibodies which can be detected in serum after _____

- a) 10 min
- b) 1 hour
- c) 5 – 7 days
- d) 3 – 5 weeks

2. Define/Write in **2 – 3** sentences (**any five**) :

10

- i) Allograft
- ii) Biological role of complement
- iii) Structure of MHC in man
- iv) Conventional vaccines
- v) Immunosuppressive drugs
- vi) Cells involved in immunity.



3. A) Write in brief (**any two**) : **6**
- i) Homograft rejection
 - ii) Production of monoclonal antibody of hybridoma technology.
 - iii) Blood transfusion reactions and complication
- B) Write in detail “ Delayed type of hypersensitivity”. **4**
4. Write in detail (**any two**) : **10**
- i) Activation of complement by classical pathway.
 - ii) Basis of antibody diversity.
 - iii) Serum sickness.
5. Write in detail (**any two**) : **10**
- i) ABO blood group system.
 - ii) Humoral immunity.
 - iii) Mechanism of Immunological tolerance.
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Seat No.	
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**B.Sc. – III (Semester – V) Examination, 2015
COMPUTER SCIENCE (Special Paper – XII)
Data Communications and Networking – I**

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

N. B. : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose correct alternatives : 10

- 1) _____ requires the maximum number of I/O ports.
a) Bus b) Star c) Ring d) Mesh
- 2) _____ layer deals with mechanical and electrical specifications of transmission medium and interface.
a) Physical b) Data link
c) Application d) Session
- 3) _____ is a analog technique.
a) TDM b) STDM c) FDM d) WDM
- 4) Adaptive algorithm is called as static routing.
a) True b) False
- 5) Peak amplitude is measured in _____
a) Hz b) MHz c) Volts d) Bits per second
- 6) _____ is called as Ford-Full Kerson algorithm.
a) Link state routing algorithm b) Shortest path routing algorithm
c) Distance vector routing d) Flooding
- 7) _____ has no flow or error control.
a) Stop and wait protocol b) Simplest protocol
c) Go back-n protocol d) Selective repeat protocol



8) _____ is the amount of time required for a message to travel from one device to another.

- a) Reliability
- b) Response time
- c) Transit time
- d) Turn around time

9) _____ device is used to connect inter networks.

- a) Router
- b) Bridges
- c) Repeaters
- d) Gateways

10) _____ is nothing but it is the effect of one wire on the other.

- a) Thermal noise
- b) Cross talk
- c) Induced noise
- d) Impulse noise

2. Answer **any five** of the following : 10

- 1) What is meant by piggybacking ?
- 2) Define data communications with its characteristics.
- 3) What is meant by TDM ?
- 4) What is meant by bit stuffing ?
- 5) What is meant by store and forward packet switching ?
- 6) What is meant by period and frequency ?

3. A) Answer **any two** of the following : 6

- 1) Explain Nyquist bit rate.
- 2) Which are the various communication standards ?
- 3) Explain two types of transmission technology.

B) Explain slotted Aloha in detail. 4

4. Answer **any two** of the following : 10

- 1) Explain the difference between virtual circuit and datagram subnets.
- 2) Explain pulse coded modulation in detail.
- 3) Explain various service primitives.

5. Answer **any two** of the following : 10

- 1) Explain TCP/IP model with diagram.
 - 2) Explain CSMA/CD in detail.
 - 3) Explain link state routing in detail.
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Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
ENGLISH (Compulsory)
Countdown-English Skills for Success

Day and Date : Wednesday, 1-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. A) Choose the right answer from the following alternatives and rewrite the sentences :

6

- 1) A lack of self esteem _____
 - a) Stimulates psychological growth
 - b) Impedes psychological growth
 - c) Accelerates psychological growth
 - d) Has no bearing on psychological growth
- 2) Haldanel's purpose in writing this essay is
 - a) To promote a scientific theory
 - b) To promote a particular theory
 - c) To promote objectivity in science
 - d) To promote subjectivity in science
- 3) As a young man, Rahim Khan was
 - a) Rebellious and resentful
 - b) Strong and athletic
 - c) Sly and deceitful
 - d) Honest and faithful
- 4) A scientist cannot decide what is
 - a) good and bad
 - b) day and night
 - c) black and white
 - d) right and wrong
- 5) The refugee mother had a _____ smile in the poem, 'Refugee Mother and Child'.
 - a) Sad
 - b) Pleasant
 - c) Mocking
 - d) Ghost
- 6) William Wordsworth is the _____ poet.
 - a) Classical
 - b) Rustic
 - c) Urban
 - d) Nature

P.T.O.



B) Select the correct idiom according to the meaning expressed in the statement. **2**

1) Lack of money is the main stumbling block to the company's growth.

- | | |
|------------------|---------------|
| a) an obstacle | b) hindrance |
| c) encouragement | d) difficulty |

2) The two teams were neck and neck until the last game.

- | | |
|---------------------------|--------------|
| a) equal | b) unequal |
| c) differently positioned | d) unmatched |

C) Tick the right combination of words in the following : **2**

- 1) Speak fluent English/Speak easy English.
- 2) Background knowledge/earlier knowledge.

2. Answer **any five** of the following questions briefly : **10**

- 1) What are the six pillars of self esteem ?
- 2) What is scientific point of view ?
- 3) What are the three results of low self esteem ?
- 4) What was Rahim Khan's occupation ?
- 5) How can human beings control their actions, according to Haldane ?
- 6) What is the difference between scientific and judge ?

3. A) Answer **any two** of the following : **6**

- 1) What is the central theme of the poem 'Daffodils' ?
- 2) What are the emotions of the Refugee Mother ?
- 3) Describe the dead child in the poem 'Refugee Mother and Child'.

B) Answer **any two** of the following : **4**

- 1) Leela is a newly married girl. How will she adapt herself to a new environment at in-laws house ?
- 2) Mr. Sharma lost his job due to his careless attitude. How will he manage the stress ?
- 3) Make a list of four ways in which you waste your time and say how you can manage your time better.



4. Write a description of a person you met at a musical concert. Give the details of his personality. **10**

OR

Write a description of your favourite cricketer with personality details.

5. Read the following passage and summarise it. **10**

Self esteem is the experience of being competent to cope with the basic challenges of life and being worthy of happiness. It consists of two elements.

- 1) Self-efficacy confidence in our ability to think, learn, choose and make appropriate decisions and
- 2) Self-respect confidence in our right to be happy and in the belief that achievement, success, friendship, respect, love and fulfillment are appropriate to us.

The basic challenges of life include such fundamentals as being able to learn a living and take independent care of one self in the world, being competent in human relationship, so that our interactions with others are, more often than not, mutually satisfying and having the resilience that allows one to bounce back from adversity and persevere in one's aspirations.



Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
PHYSICS (Special Paper – XIII)
Nuclear Physics

Day and Date : Monday, 6-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** i) **All questions are compulsory.**
ii) **Figures to right indicate full marks.**
iii) **Draw neat diagram wherever necessary.**
iv) **Use of calculator or log table is allowed.**

1. Select the correct alternative :

10

- i) An accelerator is used for increasing _____ of a charged particles.
a) Potential energy b) Kinetic energy
c) Binding energy d) Nuclear energy
- ii) The substance which emits flash of light when high energetic charged particles strikes on it is called _____
a) Phosphor b) Collector
c) Emitter d) Thermomaterial
- iii) The value of packing fraction is _____
a) $\frac{M + A}{A}$ b) $\frac{A}{M + A}$
c) $\frac{M - A}{A}$ d) $\frac{A}{M - A}$
- iv) In endothermic nuclear reaction the Q value should be _____
a) Positive b) Negative c) Zero d) Infinity
- v) For nuclear reactor _____ material is used as fuel.
a) Lanthanum b) Cadmium
c) Uranium d) Sodium

P.T.O.



3. A) Attempt **any two** of the following : 6
- i) Write note on composition of nucleus.
 - ii) Write note on phase stable orbit.
 - iii) Obtain Q value of nuclear reaction.
- B) Calculate mass of neutron from the given reaction : 4
- $${}_5\text{B}^{11} + {}_2\text{He}^4 \rightarrow {}_7\text{N}^{14} + {}_0\text{n}^1 + \text{Q}$$
- Given : Mass of $\text{B}^{11} = 11.00825$ a.m.u.
Mass of ${}_2\text{He}^4 = 4.00106$ a.m.u.
Mass of ${}_7\text{N}^{14} = 14.00420$ a.m.u.
Q Value = -1.443 a.m.u.
1 a.m.u. = 931 MeV
4. Attempt **any two** of the following : 10
- i) Explain construction and working of Betatron in detail.
 - ii) Explain liquid drop model of nucleus in detail.
 - iii) Explain the classification of elementary particles.
5. Attempt **any one** of the following : 10
- i) Explain construction and working of GM counter. Explain Geiger Plateau region.
 - ii) Explain construction and working of nuclear reactor. Which are the types of reactor ?
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Seat No.	
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B.Sc. (Part – III) (Semester – VI) Examination, 2015
CHEMISTRY
Physical Chemistry (Special Paper – XIII)

Day and Date : Monday, 6-4-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Neat diagrams must be drawn whenever necessary.**
4) **Use of logarithmic table/scientific calculator is allowed.**

1. Choose the most correct alternative and write the sentence. 10
- 1) For non-spontaneous process change in free energy is
a) Negative b) Positive c) Zero d) None of these
- 2) The dimensions of fugacity is
a) pressure b) temperature c) sec^{-1} d) dm^3
- 3) The equation $W_{\text{max}} = RT \ln K_p + \Delta_n RT$ represents
a) Clapeyron equation b) Gibb's-Helmholtz equation
c) Van't Hoff isotherm d) Van't Hoff isochore
- 4) For third order reactions, time for completion of half of the reaction is given by relation $t_{1/2} =$
a) $\frac{3}{2ka^2}$ b) $\frac{2}{3ka^2}$ c) $\frac{3ka^2}{2}$ d) $\frac{3k}{2a^2}$
- 5) $2\text{NO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{NO}_{(g)}$, is an example of _____ order reaction.
a) First b) Second c) Third d) None of these
- 6) The velocity constant of third order reaction is expressed in _____ units.
a) $\text{mole}^{-2} \cdot (\text{dm}^3)^2 \cdot \text{sec}^{-1}$ b) $\text{mole}^{-2} \cdot \text{sec}^{-1}$
c) $\text{mole}^{-2} (\text{dm}^{-3})^{-2}$ d) sec^{-1}
- 7) Unit of frequency is
a) mhos b) volts c) hertz d) ohms

P.T.O.



- 8) Rotational spectra of diatomic molecules is observed in _____ region.
a) Far infrared b) Visible c) X-ray d) Microwave
- 9) The mixture which will boil at constant temperature without change in composition is called _____ mixture.
a) Zeotropic b) Azeotropic c) Fractional d) None of these
- 10) Hydrochloric acid and water azeotropic mixture boils at _____ K.
a) 283 b) 383 c) 183 d) 83

2. Answer **any five** of the following : 10

- 1) What are ideal and non-ideal solutions ?
- 2) What is zero point energy ?
- 3) The order of the reaction $3 \text{NaClO} = 2 \text{NaCl} + \text{NaClO}_3$ appears to be three. Experimentally determined order is two. Explain.
- 4) Explain the term temperature coefficient of the reaction.
- 5) Define fugacity and activity.
- 6) Define partial molal quantity. Give any one example.

3. A) Answer **any two** of the following : 6

- 1) Mention the characteristics of third order reactions.
 - 2) Discuss triethyl amine-water system.
 - 3) Give Gibb's-Helmholtz equation in its standard form.
- B) Calculate the change in free energy of the reaction $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$ if the equilibrium constant of the reaction is 80 at 573 K. ($R = 8.314 \text{ J.K}^{-1}.\text{mole}^{-1}$) 4

4. Answer **any two** of the following : 10

- 1) Derive an expression for rate constant of third order reaction.
- 2) Describe rotational spectra of diatomic molecule.
- 3) Derive thermodynamically Van't Hoff isochore.

5. Attempt **any two** of the following : 10

- 1) Describe the distillation of solutions with the system having boiling point minimum.
 - 2) If the rate of a reaction is tripled by rise in temperature from 295 K to 305 K. Calculate the energy of activation ($R = 8.314 \text{ J.K}^{-1}.\text{mole}^{-1}$).
 - 3) Calculate the frequency and wavenumber of radiations having wavelength 1000 \AA ($C = 3 \times 10^8 \text{ m.sec}^{-1}$).
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B.Sc. III (Semester – VI) Examination, 2015
BOTANY (Special Paper – XIII)
Microbiology and Plant Pathology

Day and Date : Monday, 6-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** I) **All questions are compulsory.**
II) **All questions carry equal marks.**
III) **Draw neat and labelled diagrams wherever necessary.**
IV) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by choosing correct alternative : **(1×10=10)**
- 1) Sunlight has appreciable _____ activity and plays important role in sterilization under natural condition.
a) Insecticidal b) Bactericidal c) Herbicidal d) Fungicidal
 - 2) Many _____ are used as an antiseptic as disinfectants.
a) Biological b) Physicals c) Chemicals d) None of these
 - 3) _____ was the first to use liquid culture medium for the microbial culture.
a) Louis Pasteur b) Alexander Fleming
c) Faru Hesse d) Chamber Land
 - 4) When a culture contains more than one kind of micro-organisms is called as _____ culture.
a) Single b) Pure c) Mixed d) Both a and b
 - 5) The study which deals with nematodes is called as
a) Mycology b) Protozoology
c) Virology d) Nematology
 - 6) Many micro-organisms with their _____ activities are used in industry.
a) Physiological b) Biochemical
c) Geological d) Both a and b

P.T.O.



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B.Sc. – I (Semester – I) (Old) Examination, 2015
STATISTICS (Paper – II)
Probability and Probability Distributions – I

Day and Date : Thursday, 16-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **All questions carry equal marks.**
3) **Figures to the right indicate full marks.**

1. Choose the correct alternative : 10
- 1) If occurrence of event A do not affect on occurrence of B then A, B are
 - a) complementary events
 - b) independent events
 - c) mutually exclusive events
 - d) none
 - 2) Probability of the sample space is
 - a) 1
 - b) 0
 - c) – 1
 - d) none
 - 3) If A is subset of B then
 - a) $P(A) \geq P(B)$
 - b) $P(A) = P(B)$
 - c) $P(A) \leq P(B)$
 - d) Cannot be determined
 - 4) From the distribution function we can find
 - a) mean
 - b) median
 - c) mode
 - d) none of these
 - 5) If A and B are mutually exclusive and exhaustive events such that $P(A) = 2P(B)$ then P(A) is
 - a) $\frac{1}{2}$
 - b) $\frac{2}{3}$
 - c) $\frac{1}{3}$
 - d) 0
 - 6) For P(x) to be pmf it should satisfy the condition
 - a) $P(x) = 0$
 - b) $P(x) \leq 0$
 - c) $P(x) \geq 0$
 - d) None of these



B) If A and B are independent events then show that \bar{A} and \bar{B} are also independent. 4

4. Attempt **any two** from the following : 10

1) State and prove Baye's theorem.

2) If $P(A) = \frac{1}{2}$, $P(A/B) = \frac{2}{3}$ $P(B/A) = \frac{2}{6}$, find $P(\bar{A} \cap \bar{B})$.

3) Prove that $P(A \cap B) \leq P(A) \leq P(A \cup B)$.

5. Attempt **any one** from the following : 10

1) If X is a random variable with following probability distribution

X	-3	-2	-1	1	2	3
P(x)	K	0.2	0.3	0.15	0.13	0.12

Find :

i) K

ii) $P(X > 1)$

iii) Distribution function of X

iv) Median of X

v) Probability distribution of $|x|$.

2) Define conditional probability and prove that conditional probability satisfies three axioms of probability.



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B.Sc. – III (Sem. – VI) Examination, 2015
ZOOLOGY (Special Paper – XIII)
Physiology

Day and Date : Monday, 6-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labelled diagrams wherever necessary.**

1. Select the appropriate answer from each of the following and rewrite the sentence. **10**

- 1) Complete digestion of fat results into formation of _____
 - a) Fatty acid and glycerol
 - b) Glucose and fructose
 - c) Fatty acid and amino acids
 - d) Glucose and amino acids
- 2) β -oxidation process takes place in _____ of cell.
 - a) mitochondria
 - b) nucleus
 - c) glogi complex
 - d) lysosomes
- 3) _____ vitamin causes scurvy disease in human.
 - a) A
 - b) B
 - c) K
 - d) C
- 4) In mammals _____ is the main respiratory pigment.
 - a) haemocyanin
 - b) haemoglobin
 - c) haemoerythrin
 - d) chlorocruorin
- 5) _____ instrument is used for the measurement of blood pressure.
 - a) cytometer
 - b) haemoglobinometer
 - c) thermometer
 - d) sphygmomanometer
- 6) _____ muscle is called as voluntary muscle.
 - a) Smooth
 - b) Cardiac
 - c) Peritonalial
 - d) Striated
- 7) Transmission of nerve impulse through synapse is carried by _____ neurotransmitter substance.
 - a) cholene
 - b) acetic acid
 - c) acetylcholine
 - d) choline esterase

P.T.O.



- 8) _____ hormone causes reabsorption of nitrogenous wastes and excess water from proximal convoluted tubule of nephron.
- 9) For completion of single cardiac cycle requires _____ second.
a) 0.4 b) 0.8 c) 0.1 d) 0.2
- 10) The yellow colour of normal urine is due to presence of _____ substance.
a) bilirubin b) melanin c) biliverdin d) urochrome

2. Write short notes on (**any five**) : **10**
- 1) Define nerve impulse
 - 2) Haldane effect
 - 3) Role of vitamin D
 - 4) Draw neat labelled diagram of nephron
 - 5) Actin filament
 - 6) Define respiration.
3. A) Answer **any two** of the following : **6**
- 1) What is heart beat ?
 - 2) Physiological response of Yoga on blood circulation
 - 3) Blood pressure.
- B) Describe ultra structure of nerve cell. **4**
4. Answer **any two** of the following : **10**
- 1) ECG
 - 2) Dialysis
 - 3) Glycolysis.
5. Answer **any one** of the following : **10**
- 1) Describe mechanism of muscle contraction.
 - 2) What is digestion ? Describe digestion in stomach.
-



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B.Sc. – III (Sem. – VI) Examination, 2015
MATHEMATICS (Special Paper – XIII)
Metric Spaces

Day and Date : Monday, 6-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

1. Choose correct alternative :

10

i) The following sequences are elements of l^2 space

a) $\left\{ \frac{1}{n} \right\}_{n=1}^{\infty}$

b) $\left\{ \frac{1}{\sqrt{n}} \right\}_{n=1}^{\infty}$

c) Both a) and b)

d) None

ii) In a metric space $M = [0, 1]$ with absolute value metric

$$B\left[\frac{1}{2}; \frac{1}{4}\right] = \left(\frac{1}{4}, \frac{3}{4}\right) \text{ but } B\left[\frac{1}{4}; \frac{1}{2}\right] = \text{_____}$$

a) $\left(\frac{1}{4}, \frac{3}{4}\right)$

b) $\left(\frac{3}{4}, \frac{1}{4}\right)$

c) $\left(\frac{1}{2}, \frac{1}{4}\right)$

d) $\left[0, \frac{3}{4}\right)$

iii) The subset A of metric space $\langle M, \rho \rangle$ is dense in M then

a) $\bar{A} = M$

b) $\overline{\bar{A}} = M$

c) $A = M$

d) None

iv) Closed subset of compact metric space is

a) compact

b) not compact

c) none

v) The subset E of metric space M is closed subset of M if

a) $E = \bar{E}$

b) $E = \overline{\bar{E}}$

c) $E \neq \bar{E}$

d) None

vi) The complement of closed set is

a) open

b) closed

c) neither closed nor open



- vii) A metric space $\langle M, \rho \rangle$ is complete if
- every Cauchy sequence of points in M converges to a point in M
 - it is totally bounded
 - it is compact
 - none
- viii) For a metric space $\langle M, \rho \rangle$ the map $T : M \rightarrow M$ is a contraction on M if
- $\rho(Tx, Ty) \leq \alpha \cdot \rho(x, y)$ for $0 < \alpha \leq 1$
 - $\rho(Tx, Ty) \leq \alpha \cdot \rho(x, y)$ for $0 \leq \alpha < 1$
 - $\rho(Tx, Ty) \geq \alpha \cdot \rho(x, y)$ for $0 \leq \alpha < 1$
 - None
- ix) If metric space has Heine-Borel property then
- metric space is complete
 - metric space is compact
 - metric space is totally bounded
 - none
- x) The union of an infinite number of closed sets is
- need not be closed
 - closed
 - open
 - none

2. Attempt **any five** :

10

- i) If ρ and σ are metrics on M and if there exist constant K such that $\frac{1}{K}\sigma(x, y) \leq \rho(x, y) \leq K \cdot \sigma(x, y)$ for all $x, y \in M$ then prove that ρ and σ are equivalent metrics.
- ii) State Picard's fixed point theorem and verify, whether the mapping $T : \mathbb{R}^+ \rightarrow \mathbb{R}^+$ such that $T(x) = (1 + x^2)^{1/2}$ have fixed point where \mathbb{R}^+ is the set of positive real numbers.
- iii) State Schwarz and Minkowski's inequalities.



- iv) Prove that if E is any subset of metric space M then $E \subset \bar{E}$.
- v) If $\langle M, \rho \rangle$ is complete metric space and A is closed subset of M then prove that $\langle A, \rho \rangle$ is complete.
- vi) Prove that complement of open subset G of metric space $\langle M, \rho \rangle$ is closed.

3. A) Attempt **any two** : **6**

- 1) If d is a metric on M show that $2d$ is also a metric on M .
- 2) If G_1 and G_2 are open subsets of the metric space $\langle M, d \rangle$ then show that $G_1 \cap G_2$ is also open.
- 3) Let F be a closed subset of a metric space $\langle M, d \rangle$. Then prove that $F' = M - F$ is open.

B) Give an example of a subset of the metric space l^2 , which is bounded but not totally bounded. **4**

4. Attempt **any two** : **10**

- 1) Let E be a subset of a metric space $\langle M, d \rangle$. Prove that if the point $x \in M$ is a limit point of E then every open ball about x contains at least one point of E .
- 2) Prove that a sequence of points in any metric space cannot converge to two distinct limits.
- 3) Prove that any finite subset of a metric space $\langle M, d \rangle$ is totally bounded.

5. Attempt **any one** : **10**

- 1) Let $\langle M_1, d_1 \rangle$ and $\langle M_2, d_2 \rangle$ be metric spaces. Let $f : M_1 \rightarrow M_2$ be a function. Prove that f is continuous on M_1 if and only if $f^{-1}(F)$ is closed in M_1 whenever F is closed in M_2 .
 - 2) Let $\langle M, d \rangle$ be a complete metric space. Let T be a contraction on M . Prove that there is one and only one point x in M such that $T_x = x$.
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Seat No.	
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B.Sc. (Part – III) (Semester – VI) Examination, 2015
STATISTICS
Statistical Inference – II (Special Paper – XIII)

Day and Date : Monday, 6-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory and carry equal marks.**
2) **Figures to the right indicate full marks.**

1. Choose the most correct alternative : **10**
- i) The most pragmatic approach for determining $(1 - \alpha)$ % confidence interval is to find out
- a) Zero width Confidence Interval (C.I.)
 - b) Equal tail (C.I.)
 - c) A (C.I.) such that area of both the tails is α
 - d) None of the above
- ii) Which of the following is correct if $P(5.25 \leq \theta \leq 20.25) = 0.95$?
- a) 5.25 and 20.25 are 95 % Confidence Limits (C.L.)
 - b) The length of the confidence interval is 20.0
 - c) Both (a) and (b)
 - d) None of the above
- iii) Testing $H_0 : \mu = 5$ against $H_1 : \mu < 5$ leads to
- a) Left tailed test
 - b) Right tailed test
 - c) Two tailed test
 - d) All the above
- iv) Among all Critical Regions (C.R.) of size α , the C.R. which minimizes β is called
- a) Best C.R.
 - b) Powerful C.R.
 - c) Minimum C.R.
 - d) None of the above



- v) Neyman-Pearson lemma provides
- a) Unbiased C.R.
 - b) Admissible C.R.
 - c) Minimal C.R.
 - d) Most powerful C.R.
- vi) Sequential Probability Ratio Test (SPRT) was given by
- a) A. Wald
 - b) T. Bayes
 - c) R.A. Fisher
 - d) G.W. Snedecor
- vii) In SPRT the decision criterion is a function of probability of
- a) Type – I error
 - b) Type – II error
 - c) Both (a) and (b)
 - d) None of the above
- viii) In Wilcoxon's signed rank test, for large samples the statistic T is distributed with variance
- a) $n(n-1)(2n-1)/24$
 - b) $n(n+1)(2n+1)/24$
 - c) $n(2n+1)/12$
 - d) $n(n-1)(2n+1)/12$
- ix) If there are 12 symbols of two types equal in number, the minimum possible number of runs is
- a) 2
 - b) 4
 - c) 6
 - d) 8
- x) Which of the following is applicable for paired data ?
- a) The sign test
 - b) Signed-Rank test
 - c) The median test
 - d) Both (a) and (b)

2. Answer **any five** of the following :

10

- i) Define a simple and a composite hypothesis.
- ii) Define the probabilities of Type – I and Type – II errors.
- iii) Define power of a test and power function of a test.
- iv) Define and explain pivotal quantity.
- v) Explain the use of Likelihood Ratio Test (L.R.T.)
- vi) What are the assumptions of non parametric (N.P.) tests ?



3. A) Answer **any two** of the following : 6

i) Let X_1, X_2, \dots, X_n be a random sample of size n from $f(x, \theta) = \theta \cdot x^{\theta-1}, 0 < x < 1$. Show that the best critical region (B.C.R.) for testing $H_0 : \theta = 1$ against

$$H_1 : \theta = 2 \text{ is } \prod_{i=1}^n x_i \geq c .$$

ii) State the properties of likelihood ratio test.

iii) Explain in short the two sample runs test.

B) An urn contains 6 marbles of which θ are white and the remaining black. To test $H_0 : \theta = 3$ against $H_1 : \theta = 4$, two marbles are drawn at random without replacement and H_0 is rejected if both marbles are white otherwise H_0 is accepted. Compute the size of the test. 4

4. Answer **any two** of the following : 10

i) Obtain 100 $(1 - \alpha)\%$ confidence interval for the mean μ of $N(\mu, \sigma^2)$ when σ^2 is unknown.

ii) Obtain 100 $(1 - \alpha)\%$ confidence interval for the difference of two population proportions.

iii) Explain the Mann-Whitney U test.

5. Answer **any two** of the following : 10

i) Obtain the M.P. test of size $\alpha = 0.05$ for testing $H_0 : \mu = 0$ against $H_1 : \mu = 1$ based on a random sample from $N(\mu, 1)$ population.

ii) Obtain SPRT for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1 (\lambda_1 > \lambda_0)$, where λ is the parameter of Poisson distribution.

iii) Explain the median test for two independent samples.



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B.Sc. (Part – III) (Semester – VI) Examination, 2015
GEOLOGY (Special Paper – XIII)
Crystallography Principles of Stratigraphy and Earth's History

Day and Date : Monday, 6-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw figures wherever necessary.**

1. Fill in the blanks with correct option given in the bracket : **10**
- 1) _____ aims at the grouping of natural association of rocks, establishing their ages and correlating them with the rock formations of different areas.
(Petrology, Geology, Mineralogy, Stratigraphy)
 - 2) According to the concept of _____ past geological processes are explained in terms of the contemporary process which can be observed and recorded in the present.
(uniformitarianism, faunal succession, lateral continuity, order of superposition)
 - 3) Faces, edges, solid angles are crystal _____
(symmetry, axes, axis, elements)
 - 4) Example of closed form is _____
(basal pinacoid, brachy pinacoid, clino pinacoid, cube)
 - 5) Contact Goniometer is used to measure _____ angle of crystals.
(solid, inter facial, dip, obtuse)
 - 6) Process of formation of _____ is known as crystallization.
(rock, mineral, ore, crystal)
 - 7) Major subdivision in the geological timescale is _____
(eon, era, period, age)

P.T.O.



- 8) Smallest time unit in the geological timescale is _____
(eon, phase, era, period)
- 9) Chronostratigraphic unit corresponding to era is _____
(erathem, system, series, stage)
- 10) Use of _____ is quickest tool for correlation in stratigraphy.
(mineral, rock, maps, index fossils)

2. Answer **any five** of the following : 10

- 1) What is 'system' ? Mention its corresponding time unit. Give their examples.
- 2) What is the difference between standard stratigraphic scale and geological timescale ?
- 3) What is role of unconformity in stratigraphic correlation ?
- 4) Describe crystal elements.
- 5) Draw octahedron and show crystal elements in the diagram.
- 6) What axial planes in crystal ? Give example.

3. A) Answer **any two** of the following : 6

- 1) Describe elements of symmetry of orthorhombic system. Add note on macrodome.
- 2) What is unconformity ? Explain eparchaeon unconformity.
- 3) What is biostratigraphic unit ? Explain its role in correlation.

B) Describe elements of symmetry of monoclinic system. Add note on clinodome and prism. 4

4. Answer **any two** of the following : 10

- 1) Describe the chronostratigraphic units.
- 2) What is 'Index Fossil' ? What is its role in stratigraphy ?
- 3) Describe elements of symmetry in cube.

5. Explain **any two** of the following : 10

- 1) Describe any two criteria of stratigraphic correlation.
 - 2) Explain Epoch, series and give their examples.
 - 3) Explain tetragonal prism and pyramids.
-



Seat No.	
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B.Sc. III (Semester – VI) Examination, 2015
MICROBIOLOGY
Microbial Genetics (Special Paper – XIII)

Day and Date : Monday, 6-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

N.B. : 1) All questions are compulsory.
2) Figures to the right indicates full marks.

1. Rewrite the following sentences by selecting correct answer from given alternatives.

10

- i) Synthesis of β -galactosidase in E. coli is controlled by _____ gene.
a) Lac O b) Lac Y c) Lac Z d) Lac a
- ii) A base pair substitution that changes a codon specific for one amino acid to codon specific for another amino acid is called _____ mutation.
a) Silent b) Missense c) Nonsense d) Neutral
- iii) DNA replicates by semiconservative mode in E. coli was experimentally proved by
a) Watson and Crick b) Meselson and Stahl
c) Hershey and Chase d) Taylor
- iv) During transcription, synthesis of m-RNA takes place in _____ direction.
a) $3' \rightarrow 5'$ b) $5' \rightarrow 3'$ c) $5 \rightarrow 3$ d) $3 \rightarrow 5$
- v) DNA fragments are joined by _____ enzyme in DNA replication.
a) DNA POL I b) DNA POL III c) DNA POL II d) DNA Ligase
- vi) Mutations arising from insertion or deletion of nucleotides are called _____ mutations.
a) Suppressor b) Base pair substitution
c) Frame shift d) Spontaneous
- vii) _____ vectors possess centromeric and telomeric regions.
a) Yacs b) BACs c) Shuttle d) λ phage

P.T.O.



- viii) Maxam and Gilbert method is used for
- a) DNA finger printing
 - b) DNA sequencing
 - c) Gene mapping
 - d) Gene cloning
- ix) The plasmid vectors that are specifically designed to replicate in two different hosts are called
- a) Cosmid
 - b) Phasmid
 - c) Shuttle vector
 - d) Replacement vector
- x) The terms cistron, recon and muton were proposed by
- a) Johnsen
 - b) Morgan
 - c) Lederberg
 - d) Benzer

2. Answer in **2 to 3** sentences **any five** of the following. **10**

- 1) Electrophoresis
- 2) Cloning organisms
- 3) Genotype and Phenotype
- 4) Cosmid
- 5) Microprojectile
- 6) Lac-operon
- 7) Transcription.

3. A) Answer **any two** of the following. **6**

- i) Write briefly on Nonsense mutation.
- ii) Draw a net labelled diagram of structure of Lac operon.
- iii) Give brief account of protein engineering.

B) Write briefly on DNA finger printing. **4**

4. Answer **any two** of the following. **10**

- 1) Describe in detail mutation in bacteriophages.
- 2) Give the brief account of 'Cis-Trans Test'.
- 3) What is genetic engineering ? Give its application.

5. Answer **any two** of the following : **10**

- a) What is mutation ? Briefly describe effect of mutation on phenotypes.
 - b) Discuss in detail "Operon concept".
 - c) Give brief account of selection, detection and adaptation of mutants.
-



SLR-R – 255

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B.Sc. – III (Semester – VI) Examination, 2015
ELECTRONICS (Special Paper – XIII)
Sensors and Instrumentation

Day and Date : Monday, 6-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.
4) **Use** of log-table and calculator is **allowed**.

1. Select the correct alternative from the following : 10
- i) The principle of operation of an LVDT is based on variation of _____
- a) Self inductance b) Mutual inductance
c) Reluctance d) Conductance
- ii) In the X-T recorder, T-stands for _____
- a) Tension b) Transfer
c) Temperature d) Time
- iii) The physical phenomena of light observe in the LCD display is _____
- a) Emission b) Refraction
c) Scattering d) Polarising
- iv) The digital instruments are superior than analog instruments in _____
- a) Resolution b) Accuracy
c) Both a) and b) d) None of these
- v) The actual voltage is 0.5243 volts; measure with $3^{1/2}$ digital multimeter by selecting 2V range the display is _____
- a) 0.5243 b) 0.524
c) 00.52 d) None of these

P.T.O.



- vi) The dual slope A/D convertor uses an 8 bit counter. When the input signal v_{in} is being integrated, the counter is allow to count up to a value _____
- a) 255
b) 256
c) Proportional to v_{in}
d) $\frac{v_{in}}{256}$
- vii) The piezo-electric transducer, formed by the material, having piezo-electric property, _____
- a) Rochell-salt
b) Tourmaline
c) Quartz
d) All of these
- viii) A DSO uses 10 bit, 10^7 samples per second A to D convertor. For 100 KHz sine-wave input, the number of samples taken per cycle of the input will be _____
- a) 10^2
b) 10^3
c) 10^4
d) 10^7
- ix) Capacitive transducers are generally used for _____
- a) Static measurement
b) Dynamic measurement
c) Transient measurement
d) Both a) and b)
- x) The deviation of the true value from the desired value is _____
- a) Sensitivity
b) Resolution
c) Error
d) Expected value

2. Answer **any five** of the following :

10

- i) Distinction between sensor and transducer.
- ii) What is meant by multiplexed display ?
- iii) Why compensating techniques, are essential in measurements ?
- iv) How Load cell performs, for measurement of weight ?
- v) What is actuator ? Give example.
- vi) Select and justify the transducer, for measurement of temperature of furnace up to 1000°C .



3. A) Answer **any two** of the following : **6**
- i) Write a note on XT recorder.
 - ii) Explain dynamic characteristics of error.
 - iii) Give the important features of FET input op-amp, essential for signal conditioning in instrumentation.
- B) Design and draw the circuit diagram of instrumentation amplifier for gain 100; with Load-cell as an input. **4**
4. Answer **any two** of the following : **10**
- i) Explain the functions of various control on the front panel of dual trace oscilloscope, usually available in the laboratory.
 - ii) Distinguish between d.c. and a.c. signal conditioning, with the help of block diagram.
 - iii) Write a note on pH meter.
5. Answer **any one** of the following : **10**
- i) Design and draw the generalised system, with signal conditioning circuit for display room temperature, with LED/LCD display. Use LM 35 as temperature sensor with sensitivity 10 mv/°C in the range 0 – 100°C.
 - ii) Explain the principle and operation of digital storage oscilloscope with neat block diagram.
-



- 6) By default authentication type of ASP.Net is
- a) Window
 - b) Forms
 - c) Passport
 - d) None (security disable)
- 7) Web service file have the extension
- a) aspx
 - b) ascx
 - c) resx
 - d) asmx
- 8) Master pages are used for common design to website.
- a) True
 - b) False
- 9) In ASP.Net, result of page is pass to different page is known as
- a) Themes
 - b) Self page posting
 - c) Cross page posting
 - d) Code page front
- 10) IsPostBack property returns value in _____ data type.
- a) int
 - b) bit
 - c) string
 - d) boolean

2. Answer the following (**any 5**) :

10

- a) Difference between ASP and ASP.Net.
- b) Namespace.
- c) TextBox control.
- d) Login control.
- e) HTML server control.
- f) Web service.



3. A) Answer the following (**any 2**) : **6**
- i) Client side and server side validation.
 - ii) Creating skins.
 - iii) HTTP handler.
- B) Explain cross page posting with example. **4**
4. Answer the following (**any 2**) : **10**
- a) Explain cookies in detail.
 - b) Explain nested master pages with example.
 - c) Design web page which display 5 advertises on page.
5. Answer the following (**any 2**) : **10**
- a) Explain any 5 page directives in detail.
 - b) Explain membership provides in detail.
 - c) Design web page which uses all validation controls.
-



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B.Sc. – III (Semester – VI) Examination, 2015
PHYSICS
Material Science (Special Paper – XIV)

Day and Date : Tuesday, 7-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of log table or calculator is allowed.**
4) **Neat diagrams must be drawn whenever necessary.**

1. Select the correct alternative :

10

- i) The S.I. unit of stress is
a) poise b) pascal c) gauss d) weber
- ii) Bronze is a combination of copper and
a) aluminium b) zinc c) tin d) nickel
- iii) Conductivity is measured in
a) Ω/m b) Ωm c) Ω/m d) Ωm
- iv) The materials in increasing order of their hardness are
a) diamond, calcite, talc b) calcite, talc, diamond
c) talc, calcite, diamond d) diamond, talc, calcite
- v) Toughness _____ with rise in temperature.
a) rises b) falls
c) may rise or falls d) does not change
- vi) Cold working processes are carried out _____ recrystallization temperature.
a) at b) below
c) above d) both b) and c)
- vii) Thermosetting polymers are formed by _____ mechanism.
a) addition b) condensation
c) both addition and condensation d) none of these



- viii) Nanomaterials are the materials with dimensions
 a) < 100 nm b) > 100 nm c) > 100 μm d) > 100 mm
- ix) Ceramics are phases containing _____ materials.
 a) metallic b) non-metallic
 c) metallic and non-metallic d) organic
- x) The degree of freedom when ice, water and water-vapour coexist in equilibrium is
 a) 0 b) 1 c) 2 d) 3

2. Answer **any five** of the following : **10**

- i) Define degree of polymerization
- ii) Copper has a resistivity of $17 \times 10^{-9} \Omega\text{m}$. What is its conductivity ?
- iii) Explain the terms : i) strength ii) hardness.
- iv) What is meant by thermal expansion ?
- v) Explain slip mode of plastic deformation.
- vi) What is recrystallization temperature ? State the factors affecting recrystallization temperature.

3. A) Answer **any two** of the following : **6**

- i) What are materials ? How are they classified ?
- ii) What is polymerization ? Explain addition polymerization.
- iii) State and explain Gibb's phase rule.

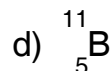
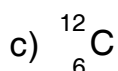
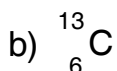
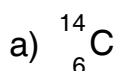
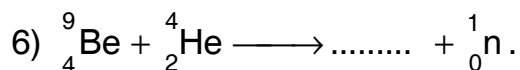
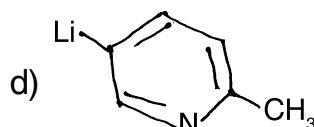
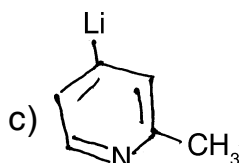
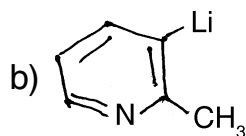
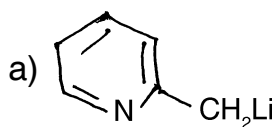
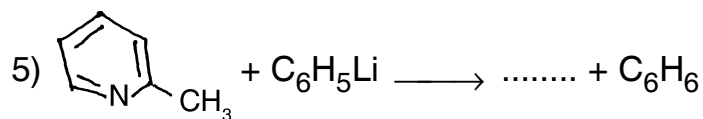
B) If the average modulus of elasticity of steel used is 205000 MPa, by how much will a wire 2.5 mm in diameter and 3 m long be extended when it supports a load of 500 kg ($g = 9.8 \text{ m/s}^2$). **4**

4. Answer **any two** of the following : **10**

- i) What is deformation ? Distinguish between elastic and plastic deformation.
- ii) Obtain the expression for critical resolved shear stress in case of plastic deformation within single crystal.
- iii) Explain in brief the applications of ceramics.

5. Answer **any one** of the following : **10**

- i) What is phase diagram ? Draw Pb-Sn phase diagram and explain the different areas in it.
- ii) Describe one physical and one chemical method of synthesizing nanomaterials.



7) YBa₂Cu₃O_{7-x} becomes superconducting at _____ °k.

a) 4.2

b) 35

c) 125

d) 93

8) Uniform formation of thin film of water on the surface of metal can be formed at _____ % of humidity in air.

a) less than 50

b) above 80

c) 50 – 60

d) 60 – 80

9) Organometallic compounds are usually produced by _____

a) Addition or substitution reactions

b) Condensation reaction

c) Chain reaction

d) Polymerization reaction

10) Due to passivity, metal becomes _____

a) active

b) inactive

c) oxidizing agent

d) corroded



2. Answer **any five** of the following : **10**
- 1) Give the flow chart for opening of Monazite sand ore.
 - 2) What is Meissner effect ?
 - 3) How will you synthesize borazine from diborane ?
 - 4) Draw a neat and labelled diagram showing the mechanism of electrochemical corrosion.
 - 5) Carbon monoxide forms stronger bond with metal in carbonyl compounds, why ?
 - 6) Why actinides are called as inner transition elements ?
3. A) Answer **any two** of the following : **6**
- i) Give the applications of semiconductors.
 - ii) Discuss the structure of SO_2 molecule.
 - iii) Explain 3C-2e bonding in $(\text{Me}_3\text{Al})_2$.
- B) Write a note on oxide film theory of passivity. **4**
4. Answer **any two** of the following : **10**
- i) Give the occurrence of lanthanides.
 - ii) What are semiconductors ? Explain intrinsic semiconductors.
 - iii) Discuss the structure of XeO_4 molecule.
5. Answer **any two** of the following : **10**
- i) Give the electronic configuration of actinides.
 - ii) What is superconductivity ? How will you prepare ceramic superconductors ?
 - iii) Distinguish between borazine and benzene.
-



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B.Sc. – III (Semester – VI) Examination, 2015
BOTANY (Special Paper – XIV)
Systematics of Angiosperms

Day and Date : Tuesday, 7-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) *All questions are compulsory.*
2) *Draw neat labelled diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*

1. Rewrite the following sentences by choosing correct answer from the given alternatives :

10

- 1) In Engler and Prantl's system of classification the dicotyledoneae is divided into _____ sub-classes.
 - a) one
 - b) two
 - c) three
 - d) four
- 2) _____ of pollination is primitive.
 - a) Entemophelous
 - b) Anemophelous
 - c) Malcophelous
 - d) Ornithophelous
- 3) Scattered vascular bundle is found in _____.
 - a) Dicotyledons
 - b) Monocotyledons
 - c) Gymnosperms
 - d) None of these
- 4) The primary parietal cell is responsible for _____.
 - a) Microspores
 - b) Meristem
 - c) Wall layers
 - d) None of these
- 5) The development of embryosac in Allium is _____ type.
 - a) monosporic
 - b) bisporic
 - c) tetrasporic
 - d) trisporic
- 6) In Bisporic embryosac the antipodal cells are _____ in number.
 - a) Three
 - b) Six
 - c) Eight
 - d) Sixteen
- 7) The flowers pollinated by insects are called as _____.
 - a) Malcophelous
 - b) Ornithophelous
 - c) Entemophelous
 - d) Hydrophelous

P.T.O.



Seat No.	
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B.Sc. – I (Semester – I) (Old) Examination, 2015
ZOOLOGY (Paper – II)
Cell Biology and Genetics

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat and labelled diagrams wherever necessary.**

1. Rewrite the sentence by selecting appropriate answer : **10**
- 1) In scanning electron microscope the specimen forms _____ image.
- a) Two dimensional b) Three dimensional
c) Four dimensional d) Adimensional
- 2) The genotypes of the person having blood group 'AB' will be _____
- a) $I^A I^A$ b) $I^A I^B$ c) $I^A i$ d) ii
- 3) In Mendelian dihybrid cross, phenotypic ratio in F_2 generation is _____
- a) 1 : 2 : 1 b) 3 : 1 c) 9 : 3 : 3 : 1 d) 8 : 8
- 4) Lysosomes stores _____
- a) ATP b) Hydrolytic enzymes
c) Proteolytic enzymes d) Fat
- 5) On outer surface of smooth endoplasmic Reticulum _____ are absent.
- a) Golgi bodies b) Mitochondria
c) Ribosomes d) Nuclear pores
- 6) The person with blood group _____ is universal donar.
- a) A b) B c) AB d) O



- 7) _____ are concerned with energy production.
- a) Mitochondria
 - b) Lysosomes
 - c) Golgi bodies
 - d) Endoplasmic Reticulum
- 8) Fluid mosaic model of plasma membrane was proposed by _____
- a) Singer and Nicolson
 - b) Robertson
 - c) Darson-Danielli
 - d) Landsteiner
- 9) The person lacking an enzyme phenyl alanine hydroxylase suffers from disease.
- a) PKU
 - b) Sickle cell anemia
 - c) Albinism
 - d) Diabetics
- 10) _____ is called father of genetics.
- a) Darwin
 - b) Lamarck
 - c) Mendel
 - d) Robert Hook

2. Write short notes on **any five** : **10**
- i) Nuclear membrane
 - ii) Functions of plasma membrane.
 - iii) Genotypes of persons having blood group 'A' and B.
 - iv) Lamp brush chromosome.
 - v) XO sex determination.
 - vi) Rh-Factor.
3. A) Attempt **any two** : **6**
- i) Describe law of segregation.
 - ii) Give the functions of Golgi complex.
 - iii) Structure of polytene chromosome.
- B) Give the principles of electron microscope. **4**
4. Attempt **any two** : **10**
- 1) Describe the structure of Eukaryotic cell.
 - 2) Describe the law of dominance.
 - 3) Describe human genetic disorder sickle cell anemia.
5. Attempt **any one** : **10**
- 1) Describe ultrastructure of mitochondrion and give its functions.
 - 2) Describe the 'XY' method of sex determination.
-



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B.Sc. III (Semester – VI) Examination, 2015
ZOOLOGY (Special Paper – XIV)
Endocrinology Environmental Biology and Toxicology

Day and Date : Tuesday, 7-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- N.B. :** i) **All questions are compulsory.**
ii) **Figures to the right indicate full marks.**
iii) **Draw neat labelled diagrams wherever necessary.**

1. Select the appropriate answer from **each** of the following and rewrite the sentence.

10

- 1) Hormones are chemical messages secreted by
 - a) Exocrine gland
 - b) Endocrine gland
 - c) Kidney
 - d) Liver

- 2) Insulin and glucagon are antagonistic hormones because they increase and decrease
 - a) Calcium
 - b) Potassium
 - c) Glucose
 - d) Sodium

- 3) _____ gland produce calcitonin.
 - a) Parathyroid
 - b) Thyroid
 - c) Adrenal cortex
 - d) Adrenal medulla

- 4) Simple Goiter is results from
 - a) Lack of Iodine
 - b) Lack of GH
 - c) Lack of PTH
 - d) Lack of Insulin

P.T.O.



- 5) Epinephrine and non epinephrine are produced by the
- | | |
|-----------------------|--------------------|
| a) Anterior pituitary | b) Pancrease |
| c) Adrenal cortex | d) Adrenal medulla |
- 6) The most important reason for decrease in biodiversity is
- | | |
|----------------------|-----------------------------------|
| a) Habitat pollution | b) Introduction of exotic species |
| c) Over evaporation | d) Habitat destruction |
- 7) Long term exposure to a toxic chemical produces an affect called
- | | |
|---------------|-----------------|
| a) Acute | b) Highly acute |
| c) Subchronic | d) Chronic |
- 8) _____ species can be defined as a species which are confined only to a particular locality.
- | | |
|---------------|------------|
| a) Exotic | b) Endemic |
| c) Endangered | d) Extict |
- 9) In a lake upper wormer oxygen rich waterzone is called
- | | |
|-------------------|--------------------|
| a) Epilimnion | b) Hypolimnion |
| c) Limenetic zone | d) Profoundal zone |
- 10) _____ habitat show highest density of living species.
- | | |
|-------------------------|---------------------|
| a) Grass land | b) Desert |
| c) Tropical rain forest | d) Temperate forest |

2. Answer **any five** of the following :

10

- i) Biomagnification.
- ii) LC₅₀ values
- iii) Prostaglandin.
- iv) Grass land habitat.
- v) Hormone receptors.
- vi) TRH.



3. A) Answer **any two** of the following : **6**
- i) Rain water harvesting.
 - ii) Disorders of thyroid gland hormones.
 - iii) Bio accumulations.
- B) Role of hormones of adrenal cortex. **4**
4. Answer **any two** of the following : **10**
- i) Action of pesticides.
 - ii) Role of parathyroid hormones.
 - iii) Solid waste management.
5. Answer **any one** of the following : **10**
- i) Discuss the roles and disorders of hormones of Islets of Langerhans.
 - ii) Describe the characteristics and faunal adaptation of marine water habitat.
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B.Sc. III (Semester – VI) Examination, 2015
MATHEMATICS (Special Paper – XIV)
Linear Algebra

Day and Date : Tuesday, 7-4-2015

Max. Marks : 50

Time : 11.00 a.m. 1.00 p.m.

N.B. : 1) All questions are compulsory.
2) Figures to the right indicate full marks.

1. Choose the correct alternative of the following : **10**
- 1) The dimension of vector space of complex numbers \mathbb{C} over a field of complex number is
a) 0 b) 1 c) 2 d) infinite
 - 2) Let W be a subspace of an infinite-dimensional vector space V . Then $\dim W$ is
a) always infinite b) always finite
c) may be finite d) none of these
 - 3) Let W be a proper subspace of a finite dimensional vector space V . Then
a) $\dim W \leq \dim V$ b) $\dim W < \dim V$
c) $\dim W = \dim V - 1$ d) none of these
 - 4) Dimension of polynomial of n^{th} degree is
a) $(n - 1)$ b) (n) c) $(n + 1)$ d) none of these
 - 5) The span $\{(0, 1, 0), (0, 0, 1)\}$ contains all points in
a) xy plane b) yz plane
c) xz plane d) none of these
 - 6) Union of two subspaces of a vector space is
a) Null space b) Always a subspace
c) Euclidean space d) None of these



3. A) Solve **any two** : 6

- 1) Prove that $L(s_1 \cup s_2) = L(s_1) + L(s_2)$, where s_1, s_2 are subsets of vector space V and $L(s)$ means linear combination of elements of s .
- 2) Let $T : V \rightarrow W$ and $S : W \rightarrow U$ be two linear transformations. If S and T are one-one onto then prove that ST is one-one onto and $(ST)^{-1} = T^{-1}S^{-1}$.
- 3) Let S and T be two subspaces of a vector space V . Prove that $S \cap T$ is also a subspace of V .

B) Define inner product space. Prove that : 4

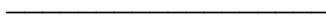
$$\|x + y\| \leq \|x\| + \|y\| \text{ for } x, y \in V (F).$$

4. Attempt **any two** : 10

- 1) Determine whether or not the following set forms a basis of \mathbb{R}^3
 $\{v_1 = (1, 1, 1), v_2 = (1, 2, 3), v_3 = (2, -1, 1)\}$
- 2) State and prove rank-nullity theorem.
- 3) Prove that the linear map $T : V_3 \rightarrow V_3$ defined by $T(e_1) = e_1 + e_2, T(e_2) = e_2 + e_3, T(e_3) = e_1 + e_2 + e_3$ is nonsingular.

5. Attempt **any one** : 10

- 1) Using Gram-Schmidt orthogonalization process find the orthonormal basis of \mathbb{R}^3 for $\{v_1 = (1, 1, 1), v_2 = (0, 1, 1), v_3 = (0, 0, 1)\}$
- 2) Let U and W be finite dimensional subspaces of a vector space V . Prove that $\dim(U + W) = \dim U + \dim W - \dim(U \cap W)$
Find $\dim(U + W)$, for $U = \{(1, 1, 0, -1), (1, 2, 3, 0), (2, 3, 3, -1)\}$ and $W = \{(1, 2, 2, -2), (2, 3, 2, -3), (1, 3, 4, -3)\}$.





Seat No.	
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B.Sc. Part – III (Sem. – VI) Examination, 2015
STATISTICS (Special Paper – XIV)
Designs of Experiment

Day and Date : Tuesday, 7-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

Instructions: 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Choose the correct alternative from the following : **10**
- i) Randomization is a process in which the treatments are allocated to the experimental units.
 - a) At the will of the investigator
 - b) In a sequence
 - c) With equal probability
 - d) None of these
 - ii) A completely randomized design is also known as
 - a) Unsystematic design
 - b) Non-restrictional design
 - c) Single block design
 - d) All of these
 - iii) Missing observation in a completely randomized design is to be
 - a) Estimated
 - b) Deleted
 - c) Guessed
 - d) None of these
 - iv) Randomized block design is a
 - a) Three restrictional design
 - b) Two restrictional design
 - c) One restrictional design
 - d) None of these
 - v) In a Latin square design, number of rows, columns and treatments are
 - a) All different
 - b) Always equal
 - c) Not necessarily equal
 - d) None of these



- vi) A Latin square design controls
- a) Two way variation
 - b) Three way variation
 - c) Multi way variation
 - d) None of these
- vii) The method of confounding is a device to reduce the size of
- a) Experiments
 - b) Replications
 - c) Blocks
 - d) None of these
- viii) If different effects are confounded in different blocks, it is said to be
- a) Complete confounding
 - b) Balanced confounding
 - c) Partial confounding
 - d) None of these
- ix) A split plot design is a sort of
- a) Confounded design
 - b) Partially nested design
 - c) Both a) and b)
 - d) Neither a) nor b)
- x) If in a randomized block design having five treatments and four replications a treatment is added, the increase in error degrees of freedom will be
- a) One
 - b) Two
 - c) Three
 - d) None of these

2. Explain **any five** from the following :

10

- i) Experimental unit.
- ii) Treatment.
- iii) Layout of an experiment.
- iv) Situations where missing plot technique is applicable.
- v) Efficiency of design.
- vi) Principle of replication in designs of experiment.

3. a) Answer **any two** of the following :

6

- i) Describe randomization.
- ii) Describe Randomized Block Design (RBD).
- iii) Explain the concepts of factorial experiment.

b) Distinguish between total confounding and partial confounding.

4



4. Attempt **any two** of the following : **10**
- i) What is Latin Square Design (LSD) ? Give its assumptions, mathematical model and analysis of variance (ANOVA) table.
 - ii) Discuss Yate's procedure of obtaining main effects and interactions in 2^2 factorial experiment.
 - iii) Describe split plot design. Give its mathematical model.
5. Answer **any two** from the following : **10**
- i) Describe two way classification. Give its mathematical model and ANOVA table.
 - ii) Obtain formula for estimating efficiency of RBD over Corresponding Completely Randomized Design (CRD).
 - iii) Describe CRD. Give its layout, mathematical model and ANOVA table.
-



- ix) GOGAT is nothing but _____
- a) glutamine-oxidase-glutarate aminotransferase
 - b) glutamine-oxi-glutamate aminotransferase
 - c) glutamine-2-oxiglutarate aminotransferase
 - d) glutamate-oxi-glutamate aminotransferase
- x) _____ amino acid is not used in protein synthesis.
- a) Methionine
 - b) Glutamine
 - c) Citrulline
 - d) Aspartic acid

2. Answer **any five** of the following : 10
- i) What is GOGAT ?
 - ii) Explain role of luciferin.
 - iii) Define isoenzyme with example.
 - iv) Termination codons.
 - v) What are glyoxysomes ?
 - vi) Explain active site.
3. A) Answer **any two** of the following : 6
- i) Strain and distortion.
 - ii) Significance of immobilization.
 - iii) Activation of amino acid.
- B) Write on assimilation of sulphate. 4
4. Answer **any two** of the following : 10
- i) Biosynthesis of purine.
 - ii) Covalent catalysis.
 - iii) Isolation of enzyme on the basis of electric charge.
5. Answer **any two** of the following : 10
- i) Biosynthesis of peptidoglycan.
 - ii) Assimilation of nitrogen.
 - iii) Extraction of enzymes.
-



Seat No.	
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**B.Sc. III (Semester – VI) Examination, 2015
ELECTRONICS (Special Paper – XIV)
Advanced Communication**

Day and Date : Tuesday, 7-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- N.B. :** 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw neat diagrams wherever necessary.*
4) *Use of log table and calculator is allowed.*

1. Select correct alternatives for the following :

10

- i) The operation of a fiber optic cable is based on the principle of
 - a) Refraction
 - b) Total internal reflection
 - c) Dispersion
 - d) Absorption
- ii) A popular light wavelength in fiber optic cable is _____ μm .
 - a) 0.7
 - b) 1.3
 - c) 1.5
 - d) 1.8
- iii) As the height of a satellite orbit gets lower, the speed of a satellite
 - a) Increases
 - b) Decreases
 - c) Remains the same
 - d) None of these
- iv) The maximum height of elliptical orbit is called
 - a) Perigee
 - b) Apex
 - c) Zenith
 - d) Apogee
- v) The master control center for a cellular telephone system is the
 - a) Cell site
 - b) Mobile telephone switching office
 - c) Central office
 - d) Branch office
- vi) Cellular telephone use _____ type of operation.
 - a) Simplex
 - b) Half duplex
 - c) Full duplex
 - d) Triplex



- vii) _____ is a microwave frequency.
a) 17 MHz b) 750 MHz c) 0.98 MHz d) 22 GHz
- viii) A popular microwave mixer diode is the
a) Gunn b) Varactor c) Hot carrier d) IMPATT
- ix) Quadrature amplitude modulation is
a) AM only b) QPSK only
c) AM plus PSK d) AM plus FSK
- x) A rule or procedure that defines how data is to be transmitted is called a(n)
a) Handshake b) Error detection
c) Data specification d) Protocol

2. Answer **any five** of the following : **10**
- i) State any four advantages of fiber optic cable.
 - ii) List the applications of satellite.
 - iii) Explain any one application of internet.
 - iv) Explain in brief digital data communication.
 - v) Give the advantages of microwaves in communication.
 - vi) Explain concept of radar.
3. A) Answer **any two** of the following : **6**
- i) Give the types of fiber optic cable and explain any one.
 - ii) Compare between waveguide and two wire transmission line.
 - iii) Explain the concept of QPSK modem.
- B) Give the types of computer networks. Explain in brief. **4**
4. Answer **any two** of the following : **10**
- i) Describe working of Klystron amplifier with neat diagram.
 - ii) Explain with block diagram fiber optic communication system.
 - iii) Write a short note on network topologies.
5. Answer **any one** of the following : **10**
- i) Draw and explain the block diagram of basic cellular system.
 - ii) With the block diagram explain satellite communication system.
-



Seat No.	
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B.Sc. – III (Sem. – VI) Examination, 2015
COMPUTER SCIENCE
Advanced Java (Special Paper No. – XIV)

Day and Date : Tuesday, 7-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose correct alternative : **10**
- I) In URL query string the _____ symbol separates the program from the parameters.
a) ? b) = c) & d) +
 - II) Apache Tomcat is a
a) Servlet b) Java program
c) Web-browser d) Web-server
 - III) _____ is a statement that gives the JSP engine information about JSP page.
a) JSP implicit object b) JSP directive
c) JSP expression d) JSP scriptlet
 - IV) Error generated during JDBC operations are thrown as
a) SQL Exception b) JDBC Exception
c) Connection Exception d) Driver Exception
 - V) Initialization can happen only once in the applets life type.
a) True b) False
 - VI) Default layout for a frame is
a) Border Layout b) Flow Layout
c) Action Layout d) None of these
 - VII) The GET and POST methods are specified in
a) CGI-program b) Java-program
c) HTML-form d) URL-string



- VIII) For Http session, say session, how do you get its attribute
- session.getValue()("Last Name")
 - session.getAttribute("Last Name")
 - session.Value()
 - session.Attribute()
- IX) The servlet container reads each _____ file and loads the servlet classes.
- source
 - html
 - class
 - web.xml
- X) _____ is a jsp-scriptlet.
- < % = i % >
 - < % = i ; % >
 - < % i ++ ; % >
 - < % i ++ >

2. Answer **any five** questions of the following : 10
- What is CGI ?
 - What is statement ?
 - What is URI ?
 - Disadvantages of servlet.
 - What is event ?
 - What is session ?
3. A) Answer **any two** of the following : 6
- Explain page directive.
 - What are the advantages of JavaBean ?
 - Differentiate GenericServlet and Httpservlet.
- B) Write a program to design student form using applet.
(fields – Name, address, dob). 4
4. Answer **any two** of the following : 10
- Write a program to check the authentication of User, using JSP.
 - Write a program to insert an employee record in a table.
(emp : empno, empno, designation)
 - Write JSP life cycle with example.
5. Answer **any two** of the following : 10
- Explain implicate objects in JSP.
 - Explain callable statement with suitable example.
 - Explain different swing components (any five).
-



Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
PHYSICS (Special Paper – XV)
Quantum Mechanics and Astrophysics

Day and Date : Wednesday, 8-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- N.B. :** i) **All questions are compulsory.**
ii) **Figures to the right indicate full marks.**
iii) **Use of log table or scientific calculator is allowed.**
iv) **Draw neat diagrams wherever necessary.**

1. Select correct alternative :

10

i) The normalization condition of the wave function ψ is given by

a) $\int_{-\infty}^{\infty} \psi^* \cdot \psi \, dv = 0$

b) $\int_{-\infty}^{\infty} \psi^* \cdot \psi \, dv = 1$

c) $\int_{-\infty}^{\infty} \psi^* \cdot \psi \, dv \leq 1$

d) $\int_{-\infty}^{\infty} \psi^* \cdot \psi \, dv \geq 1$

ii) In operator equation $H\psi = E\psi$ the eigen function is

a) H

b) ψ

c) E

d) $E\psi$

iii) The energy spectrum of a particle in one-dimensional rigid box has the nature of

a) infinite sequence of discrete energy levels

b) infinite sequence of equidistant energy levels

c) exponentially increasing

d) exponentially decreasing



iv) The kinetic energy operator is given by

a) $\hat{T} = i\hbar \frac{\partial}{\partial t}$

b) $\hat{T} = -\frac{\hbar^2}{2m} \nabla^2 + V(r)$

c) $\hat{T} = -i\hbar \frac{\partial}{\partial x}$

d) $\hat{T} = -\frac{\hbar^2}{2m} \nabla^2$

v) If orbital quantum number $l = 2$ then the values of magnetic orbital quantum number are

a) $m_l = 1, 0, -1$

b) $m_l = 0, 1, 2$

c) $m_l = 2, 1, 0, -1, -2$

d) $m_l = 3, 2, 1, 0, -1, -2, -3$

vi) Galaxies are moving away from

a) Andromeda galaxy

b) Earth

c) Milky way galaxy

d) Each other

vii) Approximate age of the universe is given by the value of

a) H

b) $\frac{1}{H}$

c) $\frac{V}{H}$

d) $\frac{H}{V}$

viii) The cloud of dust particles of carbon and rocky materials and crystals of ice are called

a) dark nebulae

b) nebulae

c) planetary nebulae

d) emission nebulae

ix) The age of universe is about

a) 10 billion years

b) 4.6 billion years

c) 20 billion years

d) 5 billion years

x) The composition of terrestrial planets is

a) hydrogen gas

b) helium gas

c) Argon gas

d) heavy rocky material

2. Answer **any five** of the following.

10

i) Write orthogonality condition for wave functions ψ_1 and ψ_2 .

ii) What is zero point energy ?



- iii) Obtain an expression for Hamiltonian operator.
 - iv) What is Hubble law ?
 - v) Mention the interstellar molecules and their proportion.
 - vi) What is a neutron star ?
3. A) Attempt **any two** of the following : **6**
- i) State and explain Heisenberg's uncertainty principle.
 - ii) Calculate the ground state energy of a particle of mass 10 gm which is free to move between two ends separated by 10×10^{-8} cm. Given Planck's constant $h = 6.6 \times 10^{-27}$ erg sec.
 - iii) Write a note on carbon-nitrogen cycle.
- B) Apply Schrödinger's wave equation to particle moving in one dimensional rigid box and hence determine energy eigen value of particle. **4**
4. Answer **any two** of the following : **10**
- i) Obtain eigen values of operator L^2 and L_z .
 - ii) Write note on big-bang theory of universe.
 - iii) Discuss the stage of planetary nebula and formation of white dwarf.
5. Answer **any one** of the following. **10**
- i) Using steady state Schrödinger's wave equation derive the energy eigen value for the motion of a particle in three dimensional box.
 - ii) Explain planetary properties of Mars. What are sunspots ? Give the prominent features of sunspots.
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B.Sc. – III (Semester – VI) Examination, 2015
CHEMISTRY (Special Paper – XV)
Organic Chemistry

Day and Date : Wednesday, 8-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) Draw **neat** diagrams and give equations **wherever necessary.**
3) Figures to **right** indicate **full** marks.

1. Choose the most correct alternative for **each** of the following : **10**
- i) When pyridine is treated with Br₂/charcoal at 300°C gives _____
- a) 4-bromopyridine
b) 2-bromopyridine
c) 3-bromopyridine
d) 2, 4, 6 tri bromopyridine
- ii) Raffinose carbohydrate is _____
- a) Monosaccharide
b) Disaccharide
c) Trisaccharide
d) Polysaccharide
- iii) Deficiency of Vitamin-A causes _____ disease.
- a) Scurvy
b) Premature aging
c) Loss of appetite
d) Night blindness
- iv) Tuberculosis is caused by _____ organism.
- a) P-vivax
b) M-leprae
c) M-tuberculosis
d) P-falciparum
- v) The active ingredient of pyrethrum is _____
- a) cyano
b) ester
c) alcohol
d) acid



- vi) The synthetic fibres are dyed with _____ dyes.
a) mordant b) disperse c) indigo d) sulphur
- vii) When the mixture of furan, ammonia and steam are passed over alumina at 450°C gives _____ compound.
a) pyrrole b) pyridine
c) pyrazole d) thiazole
- viii) _____ number of hydroxyl groups are present in open chain structure of glucose.
a) four b) five c) three d) six
- ix) The example of dependent chromophore in the dye is _____
a) carbonyl b) nitro
c) α_{20} d) quinonoid
- x) Paludrine drug is _____ derivative.
a) biguanide b) monoguanide
c) triguanide d) none of these

2. Answer **any five** of the following :

10

- i) Define chromophore and auxochrome.
- ii) Give the structure and uses of lactose.
- iii) Give the synthesis of phenolphthalein.
- iv) Give the synthesis of isoniazid.
- v) Explain weak acidic and weak basic characters of pyrrole.
- vi) Give the synthesis of carbaryl.

3. A) Answer **any two** of the following :

6

- i) Write a note on mutarotation.
- ii) What is the action of following reagent on pyridine :
 - a) $\text{KNO}_3/\text{H}_2\text{SO}_4, 300^\circ\text{C}$
 - b) $\text{NaOH}/320^\circ\text{C}$
 - c) $n\text{-C}_4\text{HgLi}/100^\circ\text{C}$.
- iii) Write a note on pyrethroids.

B) Give the different steps involved in the synthesis of Quinoline.

4



4. Attempt **any two** of the following : **10**
- i) How will you convert glucose into fructose and explain Kiliani synthesis ?
 - ii) Give the synthesis of adrenaline.
 - iii) Explain :
 - i) Vat dye and
 - ii) Mordant dye.
5. Answer **any two** of the following : **10**
- i) What is the action of following reagents on quinoline :
 - a) Na/NH_3
 - b) NaNH_2/Δ
 - c) $\text{SO}_3/\text{H}_2\text{SO}_4/220^\circ\text{C}$
 - d) $\text{C}_6\text{H}_5\text{Li}$
 - e) $\text{H}_2\text{-Pt}/\text{CH}_3\text{COOH}$.
 - ii) Explain the analytical evidences of Vit.-A for structure determination.
 - iii) Explain the size of ring of glucose by Haworth method.
- _____



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B.Sc. – III (Sem. – VI) Examination, 2015
BOTANY (Special Paper – XV)
Microbial Genetics, Plant Breeding and Biostatistics

Day and Date : Wednesday, 8-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** i) **All questions are compulsory.**
ii) **All questions carry equal marks.**
iii) **Draw neat labelled diagrams wherever necessary.**
iv) **Figures to the right indicate full marks.**

1. Rewrite the following sentences choosing correct alternatives : 10
- 1) DNA viruses are _____ shaped.
a) helical b) tadpole c) disc d) rod
 - 2) In plant, polyploidy is artificially induced by _____
a) Radiation b) Injury c) Chemical d) All of the above
 - 3) The unidirectional transfer DNA from F⁺ bacterial cell to F⁻ bacterial cell through cytoplasmic bridge is called as _____
a) transformation b) conjugation
c) transduction d) translocation
 - 4) _____ is chemical mutagenic agent used in mutation breeding.
a) DES b) EMS c) MMS d) All of the above
 - 5) Sugarcane is improved by _____ selection method.
a) mass b) pureline c) clonal d) both a) and b)
 - 6) The two varieties “Kalyan Sona” and “Sonalika” were selected from introduction method in _____ crop.
a) Wheat b) Rice c) Jowar d) Maize
 - 7) Data represented in rectangles of variable heights but of equal width is called as _____
a) Pie diagram b) Bar diagram
c) Line diagram d) Point diagram



- 8) Isolation of desirable homozygous individuals from mixed population is called as _____
- a) pure line selection b) mass selection
c) clonal selection d) both b) and c)
- 9) The phenomenon of recombination in viruses was described first time by _____
- a) N. D. Zinder and J. Lederberg b) A. D. Harshey and R. Rotman
c) M. Delburg and W. T. Bailey d) J. Lederberg and Tautam
- 10) Central sugarcane breeding research institute is situated at _____
- a) Lucknow b) Delhi c) Coimbtore d) Pune

2. Answer **any five** of the following : **10**
- i) What is conjugation ?
 - ii) Enlist the scope of plant breeding.
 - iii) Give merits of pure line selection.
 - iv) Explain arithmetic mean.
 - v) Explain types of hybridization.
 - vi) Enlist input devices of computer.
3. A) Answer **any two** of the following : **6**
- i) What is introduction and acclimatization ?
 - ii) Give demerits of mass selection.
 - iii) What is transduction ?
- B) Give an account on Mutagenic agents. **4**
4. Answer **any two** of the following : **10**
- i) Describe breeding in sugarcane.
 - ii) Explain bulk method.
 - iii) Write note on data presentation by histogram.
5. Answer **any two** of the following : **10**
- i) Describe clonal selection.
 - ii) Explain hybridization in self-pollinated crops in brief.
 - iii) Explain application of computer in biological education.
-



- 6) For any complex number z , $\cos hz + \sin hz$ is _____
 a) e^z b) e^{-z} c) $\log z$ d) z
- 7) The system of equations $x - 2y = -1$ and $-x + 3y = 3$ has _____
 a) Unique solution b) Infinite solution
 c) No solution d) None of these
- 8) The characteristic polynomial of the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is _____
 a) $\lambda^2 - 5\lambda - 2$ b) λ^2 c) λ^3 d) $\lambda^2 + 5\lambda - 2$
- 9) If $z = \cos \theta + i \sin \theta$ then $z^n - \frac{1}{z^n} =$ _____
 a) $2i \sin \theta$ b) $2i \sin n\theta$ c) $2n \sin n\theta$ d) $2 \sin n\theta$
- 10) If A is symmetric and I is an identity matrix of the same order then $(A + I)(A - I)$ is _____
 a) Symmetric b) Zero matrix
 c) Skew-symmetric d) None of these

2. Attempt **any five** of the following :

10

- 1) Solve : $x - 2y + 3z = 0$, $2x + 5y + 6z = 0$.
- 2) Using Euler's formula, show that $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$
- 3) Find polar form and $\arg z$ of $z = \sqrt{3} - i$.
- 4) For $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ find the characteristic equation.
- 5) If A and B are symmetric then show that AB is symmetric.
- 6) Show that $e^{i\theta} = \cos \theta + i \sin \theta$.



3. A) Attempt **any two** of the following : 6

- 1) Solve : $x + y = 1$, $2x + 3y = 1$, $5x - y = 11$.
- 2) Express the following matrix as the sum of a symmetric and a skew-symmetric matrices.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

3) Evaluate $\int \cos^3 \theta \, d\theta$.

B) Find the rank of the matrix : 4

$$\begin{bmatrix} 1 & 3 & 4 & 5 \\ 1 & 2 & 6 & 7 \\ 1 & 5 & 0 & 10 \end{bmatrix}$$

4. Attempt **any two** of the following : 10

1) By using the definition of hyperbolic functions, prove that

$$\operatorname{cosec} hz + \cot hz = \cot h \left(\frac{z}{2} \right).$$

2) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.

3) Using DeMoivre's theorem, solve the equation $x^5 + 1 = 0$.

5. Attempt **any one** of the following : 10

1) Verify Cayley-Hamilton theorem for the matrix :

$$A = \begin{bmatrix} 0 & 0 & 1 \\ 3 & 1 & 0 \\ -2 & 1 & 4 \end{bmatrix}. \text{ Hence find } A^{-1}.$$

2) State and prove De Moivre's' theorem.



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Seat No.	
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B.Sc. III (Semester – VI) Examination, 2015
ZOOLOGY (Special Paper – XV)
Molecular Biology and Biotechnology

Day and Date : Wednesday, 8-4-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- N.B :** 1) **All questions are compulsory.**
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagram **wherever** necessary.

1. Select the appropriate answer from **each** of the following and rewrite the sentences.

10

1) HPLS is referred to

- a) High Potential Laser Chromatography
- b) High Performance Liquid Chromatography
- c) High Performance Lesser Chromatography
- d) Highly Progressive Laminar Chromatography

2) _____ is the application of DNA probe.

- a) Hybridoma
- b) DNA finger printing
- c) Monoclonal antibody
- d) PCR

3) Long form of RFLP is

- a) Red Fragment Long Polymorphism
- b) Restriction Fragment Long Polymorphism
- c) Restriction Fragment Length Polymorphism
- d) Round Fragment Length Polymorphism

P.T.O.



- 4) Initiation Codon code for amino acid
a) Valine b) Leucine c) Proline d) Methionine
- 5) _____ is a ambiguous codon.
a) AUG b) GUG c) AAA d) UAG
- 6) _____ is single stranded RNA.
a) r RNA b) m RNA c) t RNA d) c RNA
- 7) Synthesis of m RNA is controlled by
a) DNA polymerase b) RNA polymerase
c) Ligase d) Lipase
- 8) Two strands of DNA helix run in _____ direction.
a) Anti parallel b) Parallel
c) Circular d) Perpendicular
- 9) The Southern blotting technique is proposed by
a) Edward Southern b) Northern
c) Alwine d) Davson
- 10) Two strands of DNA are linked with each other by _____ bonds.
a) Hydrogen b) S-H c) Peptide d) Glucoside

2. Write **any five** of the following :

10

- 1) DNA polymerase.
- 2) Anticodon.
- 3) Nucleotide.
- 4) RNA polymerase.
- 5) Okazaki fragments.
- 6) Nonsense codons.



3. A) Answer **any two** of the following : **6**
- 1) DNA probe.
 - 2) Hybridoma technology.
 - 3) Southern blotting.
- B) Describe the properties of genetic code. **4**
4. Answer **any two** of the following : **10**
- 1) Recombinant DNA technology.
 - 2) Applications of DNA fingerprinting.
 - 3) Post transcriptional modifications.
5. Answer **any one** of the following : **10**
- 1) Describe in detail the operon concept.
 - 2) Describe in detail PCR. Add a note on its applications.
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B.Sc. III (Semester – VI) Examination, 2015
MATHEMATICS (Special Paper – XV)
Partial Differential Equations

Day and Date : Wednesday, 8-4-2015

Max.Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Select correct alternative for each of the following : **10**

1) If number of arbitrary constants are less than the number of independent variables then by eliminating arbitrary constants we get

- a) More than one partial differential equations of order one
- b) Unique partial differential equation of order one
- c) Partial differential equation of order greater than one
- d) None of these

2) The order and degree of $y\left(\frac{p^2}{q^2} + 1\right) = zq^{3/2}$ is

- a) 1, 6
- b) 1, 7
- c) 2, 7
- d) None of these

3) Lagrange's equation is _____ partial differential equation at order one.

- a) Linear
- b) Non-linear
- c) Semi-linear
- d) Quasi-linear

4) By the substitution $u = \log x$, $v = \log y$ the _____ equation reduces to linear partial differential equation with constant coefficients.

- a) Charpit's
- b) Euler-Cauchy's
- c) Clairaut's
- d) None of these

5) The partial differential equation $yx^2p + xy^2q = xyz + pq$ is

- a) Linear and semi-linear
- b) Linear and quasi-linear
- c) Semi-linear and quasi-linear
- d) None of these



6) The non-linear equation is

a) $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = xyz$

b) $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = z + xy$

c) $z \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = x$

d) None of these

7) Standard form IV of non-linear partial differential equation of order one is

a) $f_1(x, q) = f_2(y, p)$

b) $f_1(p, q) = f_2(x, y)$

c) $f_1(x, p) = f_2(y, q)$

d) None of these

8) The number at arbitrary constants is equal to number of independent variables in the solution of first order partial differential equation, then it is called as _____ solution.

a) Complete

b) Particular

c) Singular

d) None of these

9) The Lagrange's auxiliary equation of $Pp + Qq = R$ is

a) $\frac{dz}{P} = \frac{dy}{Q} = \frac{dx}{R}$

b) $\frac{dz}{R} = \frac{dy}{Q} = \frac{dx}{P}$

c) $\frac{dz}{Q} = \frac{dy}{P} = \frac{dx}{R}$

d) $\frac{dx}{P} = \frac{dy}{P} = \frac{dz}{Q}$

10) The order and degree of $\sqrt{\left(\frac{\partial^3 z}{\partial x^3}\right)^5 + \left(\frac{\partial z}{\partial y}\right)^6} = \frac{\partial^4 z}{\partial x^2 \partial y^2}$ is

a) 3, 5

b) 4, 1

c) 4, 2

d) None of these

2. Attempt **any five** of the following :

10

1) Form a partial differential equation by eliminating a, b and c from the relation $ax^2 + by^2 + cz^2 = 1$.

2) Solve $y^2p + x^2q = x^2y^2z^2$.

3) Explain the method of solving standard form I of non-linear partial differential equation of order one.

4) Find complementary function for $(D^3D' - 4D^2D'^2 + 4DD'^3)z = 0$.

5) Find a complete integral of $p(s + q^2) = q(z - 1)$

6) If $F(D, D') = (D - 1)(D - D' + 1)$ and $f(x, y) = \cos(x + 2y)$ then find particular integral.



3. A) Attempt **any one** of the following : 6

- 1) Derive the partial differential equation by the elimination of arbitrary function ϕ from the equation $\phi(u, v) = 0$ where u, v are functions of x, y, z .
- 2) Solve $p + 3q = z + \cot(y - 3x)$.
- 3) Find a complete integral of $z(xp - yq) = y^2 - x^2$.

B) Solve $(2D^2 - 5DD' + 2D'^2)z = 5 \sin(2x + y)$. 4

4. Attempt **any two** of the following : 10

- 1) Find the general solution of $x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = (x + y)z$.
- 2) Solve $(D^2 - 2DD' + D'^2)z = e^{x+2y} + x^3$.
- 3) Solve $(D + D')(D + D' - z)z = \sin(x + 2y)$.

5. Attempt **any one** of the following : 10

- 1) Explain the Charpit's method for solving the non-linear partial differential equations of order one and hence evaluate $px + qy = pq$.
- 2) For homogeneous linear partial differential equation with constant coefficients

prove that $\frac{1}{(bD - aD')^n} \leftarrow (ax + by) = \frac{x^n}{b^n n!} \leftarrow (ax + by)$ and evaluate

$$\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 12(x + y).$$



Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
STATISTICS (Special Paper – XV)
Limit Theorems, Reliability and Queuing Theory

Day and Date : Wednesday, 8-4-2015
 Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
 2) **Figures to the right indicate full marks.**
 3) **Use of statistical tables and calculators is allowed.**

1. Choose the most correct alternative : **10**

1) Let $\{X_n, n \geq 1\}$ be a sequence of iid r.vs. each with mean μ and variance σ^2 .

Let $S_n = \sum_{i=1}^n X_i$. Then the limiting distribution of Z is normal if $z =$ _____

- a) $\frac{S_n - \mu}{(\sigma / \sqrt{n})}$ b) $\frac{S_n - n\mu}{\left(\frac{\sigma}{\sqrt{n}}\right)}$ c) $\frac{S_n - n\mu}{n\sigma^2}$ d) $\frac{S_n - n\mu}{\sigma\sqrt{n}}$

2) If $X_n \xrightarrow{P} X$, then which of the following statements is incorrect ?

a) $(X_n - X) \xrightarrow{P} 0$ b) $\frac{X_n - X}{K} \xrightarrow{P} \frac{1}{K}$

c) $X_n^2 \xrightarrow{P} X^2$ d) $KX_n \xrightarrow{P} KX$

3) Probability of survival of any component at time t ($t \rightarrow \infty$) will be _____

- a) 1 b) 0
 c) greater than 0 d) can not be calculated

4) Let X_1, X_2, \dots, X_n be a random sample from $\exp(\theta)$. Let Y_1, Y_2, \dots, Y_n be another independent sample from $\exp(\theta)$. Let $u = \min\{X_i\}$, $v = \min\{Y_j\}$ and $Z = u - v$. Then z has _____ distribution.

- a) Laplace b) Exponential
 c) Cauchy d) None of these



3. A) Attempt **any two** from the following : 6

- i) State the structure function for a series system and parallel system of two components.
- ii) If X is a r.v. with $E(X) = 3$, $V(X) = 13$, use Chebesheve's inequality to determine lower bound for $P[-2 < X < 8]$.
- iii) Define order statistic and find the cdf of n^{th} order statistic for a random sample of size n , in usual notations.

B) Let $X_i \sim P(\lambda)$ $i = 1, 2, \dots, n$ are iid rvs. Test whether WLLN holds good for this sequence of rvs. 4

4. Attempt **any two** from the following : 10

A) Define reliability function $R(t)$ and hazard rate $\lambda(t)$ and show that $\lambda(t) = -\frac{R'(t)}{R(t)}$.

B) At a cycle repair shop, on an average one customer arrives every 5 minutes and service time is 4 minutes per customer. Assuming that all conditions for using $M/M/1 : \infty / \text{FIFO}$ model are satisfied, find

- a) Probability that a server is busy
- b) Average queue length
- c) Average waiting time of a customer in queue.

C) Define convergence in distribution. If $P\left[X_n = \frac{3-2n}{n}\right] = \frac{4n-3}{12n}$ and

$$P\left[X_n = \frac{3n+1}{n}\right] = \frac{8n+3}{12n}, \text{ examine the convergence in distribution.}$$

5. Attempt **any two** from the following : 10

A) Show that the distribution of sample median of a random sample from $U(0, 1)$ distribution is Beta distribution. State mean of the sample median.

B) Let X_i are iid $P(0.02)$ $i = 1, 2, \dots, 100$. Let $S = \sum_{i=1}^{100} X_i$. Use CLT to evaluate

$$P[S \geq 3].$$

C) Write a note on queue configuration.



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**B.Sc. – III (Sem. – VI) Examination, 2015
GEOLOGY (Special Paper – XV)
Phanerozoic Stratigraphy of India**

Day and Date : Wednesday, 8-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

- Instructions:** 1) *All questions are compulsory.*
2) *Draw neat diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*

1. Fill in the blanks with correct answer from the given options : **10**
- 1) Golden Oolites occur in _____ formation of Jurassic of Kutch.
a) Chari b) Umia c) Patchum d) Katrol
 - 2) Chara and Azolla along with other plant remains are found in _____ rocks.
a) Tichy b) Deccan Trap c) Bagh bed d) Kutch
 - 3) Nodular and Oolitic Limestone belongs to _____ beds.
a) Bagh b) Lameta c) Bhuj d) Umia
 - 4) Inter-Trappean beds are present in
a) Bagh beds b) Gondwana beds
c) Lameta beds d) Deccan trap
 - 5) Kamathi formation is correlated with _____ formation.
a) Talchir b) Bararkar c) Panchet d) Ranigang
 - 6) Economic importance of Gondwana is its
a) Glossopteris b) Gangmopteris
c) Coal d) Diamond
 - 7) Narmada Valley is location for _____ beds.
a) Bagh b) Infra Trappean c) Laterite d) Coal
 - 8) The Inter-Trappean Beds include _____ fossil.
a) Trilobite b) Trinucleus c) Productus d) Physa

P.T.O.



- 9) The age of Deccan-Traps is
a) Upper cretaceous to Eocene b) Lower Eocene
c) Jurassic d) Jurassic to Eocene
- 10) Vertical extent of Infra-Trappean beds is less as compared to its lateral horizontality which belongs to
a) Deccan Traps b) Lameta c) Gondwana d) Bagh

2. Answer **any five** of the following : **10**
- 1) Climate during Siwalik Sediments.
 - 2) Lithology of Lameta beds.
 - 3) Palaeo-climate of Gondwana.
 - 4) Fossils of Gondwana.
 - 5) Structure of Deccan Traps.
 - 6) Economic importance of Gondwana.
3. A) Answer **any two** of the following : **6**
- 1) Lithology of Bagh beds.
 - 2) Structure of Bagh beds.
 - 3) Economic importance of Deccan Traps.
- B) Structure and fossils of Deccan Traps. **4**
4. Answer **any two** of the following : **10**
- 1) Jurassic of Kutch.
 - 2) Stratigraphy of Maharashtra.
 - 3) Trichnopoly formation.
5. Explain **any two** of the following : **10**
- 1) Haimanta group.
 - 2) Siwalik Group.
 - 3) Ariyalur Lithology.
-



Seat No.	
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B.Sc. (Part – III) (Sem. – VI) Examination, 2015
MICROBIOLOGY
Special Paper – XV : Environmental Microbiology

Day and Date : Wednesday, 8-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

N. B. : I) **All questions are compulsory.**
II) **Figures to the right indicate full marks.**

1. Rewrite the sentences by choosing correct answer from given alternatives : **10**
- i) Green house effect is caused due to _____
- a) Less amount of CO₂ in atmosphere
b) High amount of CO₂ in atmosphere
c) Less amount of ozone in atmosphere
d) Acid rain
- ii) Chemical which results in the formation of acid rain is _____
- a) HCl b) H₂SO₄ c) NO₃ d) Ozone
- iii) _____ are non biodegradable.
- a) Radioactive substances b) Fertilizers
c) Crop waste d) Agrochemicals
- iv) The photochemical smog is due to _____
- a) Nitrogen oxide b) Sulphur dioxide
c) H₂S d) Carbon dioxide
- v) _____ protect us from harmful effects of ultraviolet radiations.
- a) Clouds b) Ozone
c) Thick layer of CO₂ d) Smog
- vi) Erosion observed in Taj Mahal is attributed to _____
- a) Green house effect b) CO₂
c) Acid rain d) CFC



3. A) Answer **any two** : **6**
- i) Give the characteristics of embedded system.
 - ii) Illustrate with suitable example, the use of for statement in C language.
 - iii) List the steps involved in programming of microcontroller using flash magic.
- B) Write an embedded C-program for 8951 microcontroller to generate a square wave. **4**
4. Answer **any two** : **10**
- i) Discuss basic architecture of an embedded system.
 - ii) Write a C-program to illustrate the use of one dimensional array.
 - iii) Write embedded C-program for frequency measurement.
5. Answer **any one** : **10**
- A) Design an embedded system to generate triangular and sawtooth waveforms. Draw the flowchart.
- B) Explain the basics of serial data communication . Illustrate with simple embedded C-program.
-



8) In _____ option is used to save file and remains in editing mode.

- a) :w b) :x c) :wq d) none

9) In chmod command only execute permission is used for _____ octal number.

- a) 1 b) 2 c) 3 d) 4

10) In a linux file system home is top level directory.

- a) True b) False

2. Answer **any five** of the following : **10**

- 1) What is file, its type.
- 2) What are difference between rm and rmdir command ?
- 3) What are variable and constant ?
- 4) Explain cat and lpr command.
- 5) Explain tail and cut filter.
- 6) Explain find command.

3. A) Answer **any two** of the following : **6**

- 1) Explain pipe command.
- 2) Write short note on advance filter.
- 3) Explain history of linux operating system.

B) Explain vi-editor. **4**

4. Answer **any two** of the following : **10**

- 1) What is redirection ? Explain it.
- 2) Explain shell in linux.
- 3) Write a program to display number is prime or not.

5. Write short note on (**any four**) : **10**

- 1) .exrc file
 - 2) File and od command
 - 3) x-Windows
 - 4) Delayed execution
 - 5) Chown and chgrp.
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Seat No.	
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B.Sc. (Part – III) (Semester – VI) Examination, 2015
PHYSICS (Special Paper – XVI)
Electronics and Computer Programming

Day and Date : Monday, 13-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions:**
- 1) **All** questions are **compulsory**.
 - 2) Figures to the **right** indicate **full** marks.
 - 3) Draw **neat** diagrams **whenever** necessary.
 - 4) **Use** of calculator or log table is **allowed**.

1. Select the correct alternatives.

10

- i) The output of non-inverting OP-AMP is _____ with input.
a) constant b) reverse c) out of phase d) in phase
- ii) Common mode gain in OP-AMP is always
a) less than one b) greater than one
c) one d) infinite
- iii) The IC 555 is a build in _____ circuit.
a) Diff. Amp b) Timer
c) Schmitter-trigger d) Adder
- iv) A diac is a _____ terminal device.
a) two b) four c) three d) one
- v) Firing angle of SCR depends on _____ current.
a) gate b) load c) anode d) cathode
- vi) One Kilobyte has _____ bytes.
a) 1032 b) 1042 c) 1034 d) 1024
- vii) Software acts as _____ between the hardware and users programs.
a) interface b) compiler c) language d) interpreter

P.T.O.



- viii) All the keywords should be in
- a) digits
 - b) upper case letters
 - c) lower case letters
 - d) single digit
- ix) Maximum length of string constant is _____ characters.
- a) 325
 - b) 235
 - c) 523
 - d) 335
- x) Conditional operator is equivalent to following control structure
- a) do_while
 - b) for
 - c) if_while
 - d) if_else

2. Answer **any five** of the following. **10**

- 1) Define differential amplifier.
- 2) Define duty cycle in astable multivibrator.
- 3) Define break over voltage in SCR.
- 4) Define compiler and interpreter.
- 5) What is keyword ? Define.
- 6) What is algorithm ?

3. A) Answer **any two** of the following. **6**

- 1) Give the comparison between normal amplifier and differential amplifier.
- 2) Draw the pin connections of IC-555 timer, explain function of each pin.
- 3) Explain working of diac.

B) Describe in brief lower level and higher level languages. **4**

4. Answer **any two** of the following. **10**

- 1) Explain the construction and working of Triac.
- 2) Give an account of increment and decrement operators in C++.
- 3) Explain astable operation of IC 555 timer.

5. Answer **any one** of the following. **10**

- 1) Discuss OP-AMP as an inverting amplifier. Obtain voltage gain with feedback.
 - 2) What are control structures in C++ ? Illustrate with examples.
-



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B.Sc. – III (Semester – VI) Examination, 2015
CHEMISTRY (Special Paper – XVI)
Analytical and Industrial Organic Chemistry

Day and Date : Monday, 13-4-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labelled diagrams and give equation wherever necessary.**

1. Select the most correct alternative from those given below and rewrite the sentence :

10

- i) Decolourisation of cane juice is done by
- | | |
|-----------------------------|-------------------------|
| a) activated carbon process | b) ion exchange process |
| c) sulphitation process | d) none of these |
- ii) Separation of components of mixture in column chromatography depends on
- | |
|--|
| a) selective mobility |
| b) selective adsorption and desorption |
| c) distribution |
| d) none of these |
- iii) _____ is used as adsorbent in thin layer chromatography.
- | | |
|---------------|-----------------|
| a) Alumina | b) Kieselguhr |
| c) Silica gel | d) All of these |
- iv) Masecuite is syrupy mixture of
- | |
|--------------------------------|
| a) Molasses and sugar crystals |
| b) Sugar crystals and juice |
| c) Juice and molasses |
| d) None of these |

P.T.O.



- v) Deriphat is _____ detergent.
- | | |
|-------------|------------------|
| a) anionic | b) ampholytic |
| c) cationic | d) none of these |
- vi) Polymers made from one type of monomer are
- | | |
|----------------|--------------|
| a) Homopolymer | b) Copolymer |
| c) Elastomers | d) Resins |
- vii) The monomer used in PVC manufacture is
- | | |
|---------------|-----------------|
| a) Polyethene | b) Chloroethane |
| c) Styrene | d) Formaldehyde |
- viii) There are _____ principles of green chemistry.
- | | |
|-------|-------|
| a) 12 | b) 16 |
| c) 22 | d) 10 |
- ix) The process of desizing is used
- | |
|---------------------------------|
| a) for removing starch material |
| b) to remove grease, wax etc. |
| c) to remove colour from fiber |
| d) to remove dust from fiber |
- x) _____ is mixed in denatured alcohol.
- | | |
|---------------------|-------------|
| a) n propyl alcohol | b) pyridine |
| c) methyl alcohol | d) water |

2. Answer **any five** of the following :

10

- i) What is imbibition in the process of extraction of juice ?
- ii) What are oils and fats ?
- iii) Explain affination used in refining of raw sugar.
- iv) Write advantages of TLC over paper chromatography.
- v) Explain the terms bleaching and dyeing.
- vi) Give preparation of polystyrene.



3. A) Attempt **any two** of the following : 6
- i) Explain in brief the raw material used in manufacture of soap.
 - ii) Explain the process of clarification of sugar juice.
 - iii) Give synthesis and uses of Buna S.
- B) Explain hot process of manufacture of soap. 4
4. Answer **any two** of the following : 10
- i) Explain in short manufacture of alcohol by fermentation of molasses.
 - ii) Discuss sizing process in textile industry.
 - iii) Discuss principle and experimental technique of column chromatography.
5. Answer **any two** of the following : 10
- i) Explain principle and experimental process of gas chromatography.
 - ii) What are zeolites ? Explain their use as ecofriendly catalysts.
 - iii) Explain synthesis and uses of polyethylene and PVC.
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Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
BOTANY (Special Paper –XVI)
Molecular Biology and Biotechnology

Day and Date : Monday, 13-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **All questions carry equal marks.**
3) **Figures to the right indicate full marks.**
4) **Draw neat and labelled diagrams wherever necessary.**

1. Write the correct answer :

10

- 1) DNA fingerprinting technique was developed by _____
 - a) Meselson and Stahl
 - b) Alec Jeffrey
 - c) Watson and Crick
 - d) Sharp and Roberts
- 2) Ployethylene Glycol is used as _____ in tissue culture.
 - a) Sterilization agent
 - b) Stabilizing medium
 - c) Fusogen
 - d) Isolation medium
- 3) Diameter of B DNA is _____ Angstrom units.
 - a) 10
 - b) 20
 - c) 30
 - d) 34
- 4) Southern blotting technique is used to separate _____
 - a) DNA
 - b) RNA
 - c) Proteins
 - d) Vitamins
- 5) _____ discovered the split genes in Adenovirus2 for which they were awarded Nobel Prize.
 - a) Sharp and Roberts
 - b) Hogness et al
 - c) Chambon et al
 - d) Alec Jeffrey



3. A) Answer **any two** of the following : **6**
- 1) Give the applications of micropropagation.
 - 2) Write a note on PCR technique and its uses.
 - 3) Draw a diagram of hybrid DNA model explaining recombination at molecular level.
- B) Explain the structure of gene in eukaryotes with suitable examples. **4**
4. Answer **any two** of the following : **10**
- 1) Write a note on vectors used in recombinant DNA technology.
 - 2) Explain Agrobacterium is a natural genetic engineer.
 - 3) Give an account of Lac Operon.
5. Answer **any two** of the following : **10**
- 1) Describe the method of anther culture and give its applications.
 - 2) Give an account of semiconservative mode of DNA replication.
 - 3) What is DNA fingerprinting ? What are its applications ?
-



Seat No.	
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B.Sc. – I (Semester – I) (Old) Examination, 2015
BOTANY (Paper – I)
Microbiology and Cryptogams

Day and Date : Friday, 17-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **All questions carry equal marks.**
3) **Draw neat labelled diagrams wherever necessary.**
4) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by choosing correct alternatives : **10**
- 1) The shape of coccus bacterium is _____
a) Spherical b) Spiral c) Rodlike d) filamentous
 - 2) G. M. Smith has divided cryptogams into _____ divisions.
a) 7 b) 14 c) 13 d) 4
 - 3) PPLO and MLO terms are commonly used for _____
a) BGA b) Plant viruses c) Mycoplasma d) Crustose Lichen
 - 4) The organism which donot show cellular organisation is _____
a) Fungi b) Bacteria c) BGA d) Virus
 - 5) _____ moss is used in surgical dressings.
a) Riccia b) Anthoceros c) Sargassum d) Sphagnum
 - 6) Host of Albugo is _____
a) Bhendi b) Jowar c) Mustard d) Sugarcane
 - 7) Selaginella stem shows _____
a) Siphonostele b) Protostele c) Haplostele d) None of these
 - 8) Mode of nutrition in Mucor is _____
a) Saprophytic b) Autotrophic
c) Symbiotic d) Both b) and c)
 - 9) _____ is a non-vascular cryptogams.
a) Bryophyte b) Pteridophyte c) Gymnosperm d) Angiosperm
 - 10) Heterocyst is found in _____ filament.
a) Spirogyra b) Nostoc c) Sargassum d) Volvox



2. Answer **any five** of the following : **10**
- i) Which algae are used as biofertilizers ?
 - ii) What is bacteria ?
 - iii) Sketch and label the diagram of bacteriophage.
 - iv) Give systematic position of Spirogyra.
 - v) What is mycoplasma ?
 - vi) Give the function of heterocyst in Nostoc.
3. A) Answer **any two** of the following : **6**
- i) Give economic importance Lichens.
 - ii) Give general characters of bacteria.
 - iii) Give classification of virus.
- B) Describe the anatomical structure of Riccia thallus. **4**
4. Answer **any two** of the following : **10**
- i) Describe in brief asexual reproduction in Albugo.
 - ii) Describe asexual reproduction in Nostoc.
 - iii) Give economic importance of algae.
5. Answer **any one** of the following : **10**
- i) Give systematic position, habit and habitat, external morphology and anatomy of stem in Selaginella.
 - ii) Describe the thallus structure and sexual reproduction in Spirogyra.
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Seat No.	
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B.Sc. (Part – III) (Semester – VI) Examination, 2015
ZOOLOGY (Special Paper – XVI)
Biotechniques and Applied Zoology

Day and Date : Monday, 13-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat and labelled diagrams wherever necessary.**

1. Select the appropriate answer from **each** of the following and rewrite the sentence. **10**

- 1) The stem cells are _____ cells.
 - a) Nutripotent
 - b) Totipotent
 - c) Electropotent
 - d) Pleuripotent
- 2) The full form of TLC is
 - a) Thin layer chromatography
 - b) Thin liquid chromatography
 - c) Thick layer chromatography
 - d) Thick liquid chromatography
- 3) The weight of given sample is measured by the device
 - a) Spectrophotometer
 - b) Balance
 - c) pH meter
 - d) Calorimeter
- 4) The silviculture is related with study of
 - a) Oysters
 - b) Bivalves
 - c) Mytillus
 - d) Snails
- 5) The casting of skin of silkworm is called
 - a) Ecolysis
 - b) Hibernation
 - c) Silk production
 - d) Cocoon formation



- 6) In the biological control of pests are used
- a) Chemicals
 - b) Fumigants
 - c) Pheromones
 - d) Biological agents
- 7) An oral case of catterpillar of silk moth is called
- a) Cyst
 - b) Pupa
 - c) Cocoon
 - d) Egg case
- 8) The development of an embryo outside the body is called _____ development.
- a) in livo
 - b) in vivo
 - c) in nivo
 - d) in vitro
- 9) The branch of zoology deals with the rearing of aquatic animals is called
- a) Silviculture
 - b) Aquaculture
 - c) Apiculture
 - d) Fishiculture
- 10) Tribolium is the pest of _____ crop.
- a) Cotton
 - b) Maize
 - c) Jawar
 - d) Pea

2. Write short note on following (**any five**) :

10

- i) Grasshopper
- ii) TLC
- iii) pH meter
- iv) Stem cells
- v) Trawler
- vi) Principles of silkworm rearing.



3. A) Answer **any two** of the following : **6**
- i) Write about use and principles of calorimeter.
 - ii) Describe the agriculture pest-RAT.
 - iii) Describe the economic importance of pearl.
- B) Give an account of polymorphism in termites **4**
4. Answer **any two** of the following : **10**
- i) Write in brief the viral diseases of silk moth.
 - ii) Describe in brief the various gears used in fishiculture.
 - iii) Write about the application and use of spectrophotometer.
5. Answer **any one** of the following : **10**
- A) What are the pests ? Describe in brief various pests you have studied. Add a note on the biological pest control.
 - B) What is pearl culture ? Explain the methods which are followed in pearl culture.
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Seat No.	
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B.Sc. – III (Sem. – VI) Examination, 2015
MATHEMATICS (Special Paper – XVI)
Graph Theory

Day and Date : Monday, 13-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Select the correct alternative for **each** of the following : **10**
- 1) Platonic graphs are always _____ graphs.
- a) Complete b) Complete bipartite
c) Regular d) None of these
- 2) If $e = (u, v)$ is directed edge in dia graph then u is called as
- a) Terminal vertex b) Isolated vertex
c) Initial vertex d) None of these
- 3) The maximum number of edges in a simple graph with n vertices is
- a) $\frac{n}{2}$ b) $\frac{n+1}{2}$
c) $\frac{n(n+1)}{2}$ d) $\frac{n(n-1)}{2}$
- 4) Every edge of a tree is a
- a) cut set b) cut vertex
c) bridge set d) none of these
- 5) In tree between every pair of vertices there is _____ path.
- a) no b) one and only one
c) more than one d) none of these



- 6) Path does not contains repeated
- a) Vertex and repeated edges
 - b) Vertex
 - c) Edges
 - d) None of these
- 7) The binary number 1111 is equivalent to the hexadecimal number
- a) D
 - b) E
 - c) F
 - d) B
- 8) $111.11_{(2)} =$
- a) $7.76_{(10)}$
 - b) $7.78_{(10)}$
 - c) $7.79_{(10)}$
 - d) None of these
- 9) A directed graph is called _____ connected if for any pair of vertices of the graph both the vertices of the pair are reachable from one another.
- a) Weakly
 - b) Unilaterally
 - c) Strongly
 - d) None of these
- 10) A vertex with zero in degree is called
- a) sink
 - b) source
 - c) total degree
 - d) none of these

2. Attempt **any five** of the following :

10

- 1) Draw the graphs of the chemical molecules of
 - a) Methane(CH_4)
 - b) Propane (C_3H_8)
- 2) What is the size of an r-regular (p, q) graph ?
- 3) Define the term Hamiltonian graph.
- 4) Convert the binary number 10110 to the hexadecimal equivalent.
- 5) Give an example of a graph which contain an Eulerian circuit that is also a Hamiltonian cycle.
- 6) What is the value of postfix expression ?

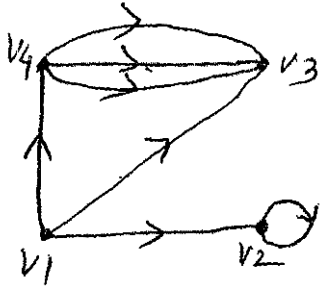
$$823 * - 2 \uparrow 63 / +$$



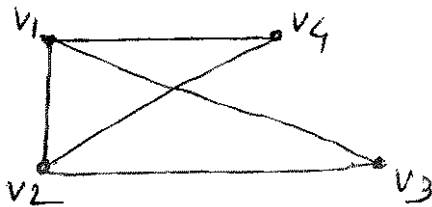
3. A) Attempt **any two** of the following graph :

6

1) Find the degree, out degree and of total degree of each vertex of the following graph.



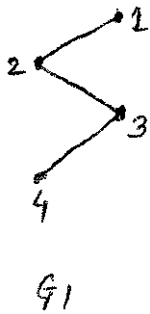
2) Find the all spanning trees of the following graph



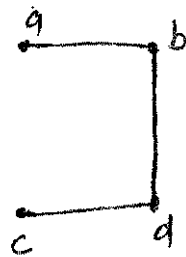
3) Convert hexadecimal number 2EB7 to decimal number.

4

B) Show that the given pair of graphs are isomorphic.



G1



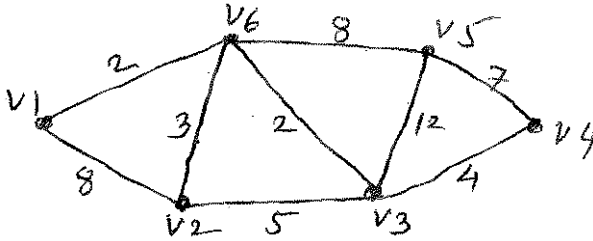
G2



4. Attempt **any two** of the following :

10

1) Find the minimal spanning tree of the graph using Prim's algorithm.



2) Define incidence matrix and write down the graph corresponding to the following incidence matrix.

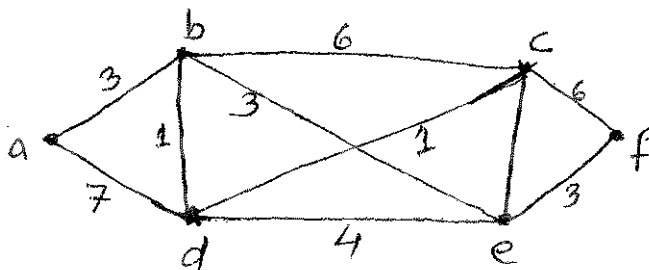
$$\begin{bmatrix} 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 \end{bmatrix}$$

3) Convert $(3287.5100098)_{10}$ into octal.

5. Attempt **any one** of the following :

10

1) Write Dijkstra's algorithm to find the shortest path between two vertices in a weighted graph, and then apply it to find shortest path from a to f.



2) i) Prove that a connected graph contains an Eulerian trail, but not an Eulerian circuit, if and only if it has exactly two vertices of odd degree.

ii) Prove that the number of edges in a bipartite graph with n vertices is at

most $\frac{n^2}{4}$.



Seat No.	
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B.Sc. III (Semester – VI) Examination, 2015
STATISTICS (Special Paper – XVI)
C-Programming

Day and Date : Monday, 13-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

N.B. : 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- I. Select the most correct alternative : 10
- i) C language came into existence in the year
a) 1960 b) 1970 c) 1972 d) 1967
- ii) Which of the following shows the correct hierarchy of arithmetic operations in C ?
a) *, /, +, -, () b) (), / or *, - or +
c) (), *, *, *, +, / d) none of these
- iii) If a is an integer then $a = 5\% - 3$ will return a value
a) 1.66 b) 1 c) -2 d) 2
- iv) If $x = 10$; $y = (x > 6 ? (x < 15 ? 20:30):25)$;
then y will be
a) 25 b) 15 c) 20 d) 30
- v) The following assignment statement :
 $x = x - a$ can be expressed in compound assignment operator as
a) $x - = a$; b) $x = -a$; c) $x/ = a$; d) $x* = a$;
- vi) Which of the following statement is used to jump out of a loop instantly, without waiting to get back to the conditional test in a C-program ?
a) continue b) break c) exit d) none of these
- vii) If P1 is an integer pointer with an initial value, say 2800, then after the operation $P1 = P1 + 1$;, the value of P1 will be
a) 2801 b) 2802 c) 2804 d) 2808



- viii) The array char name [20] can consist of a maximum of _____ characters.
- a) 10 b) 14 c) 16 d) 20
- ix) An array is a group of related data items that has a
- a) different names b) common name
c) common number d) none of these
- x) Which mode is used to open a file for writing purpose ?
- a) r b) w c) a d) none of these

2. Attempt **any five** from the following : **10**

- i) What are the rules for constructing a real constants ?
- ii) What do you mean by declaration of variables ?
- iii) Explain if --- else statement in C-program.
- iv) Give the general format for the function definition as per the modern method in C-programming.
- v) Explain the use of pointer in C-programming.
- vi) Explain getchar () and putchar ().

3. A) Attempt **any two** from the following : **6**

- i) Explain relational and logical operators.
- ii) Explain passing values between functions.
- iii) Explain the strcmp ().

B) Write a C-program to find mean and variance of the first n natural numbers by using do-while statement. **4**

4. Attempt **any two** from the following : **10**

- i) Explain the concept of looping and for statement (for loop) in C-programming.
- ii) State the general form of array declaration in one-dimensional arrays. Write a C-program to find average marks obtained by a class of 25 students in a test by using an array.
- iii) Explain passing pointer as parameters of function with illustrations.



5. Attempt **any two** from the following :

10

- i) Write down the syntax of printf and scanf statement and explain any one of them.
 - ii) Write a C-program to find factorial of n by using recursive formula, when n is positive integer.
 - iii) Write a C-program to read an integer and prints it out backwards, using while statement.
-



Seat No.	
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B.Sc. (Part – III) (Sem. – VI) Examination, 2015
GEOLOGY Special (Paper No. – XVI)
Economic Geology

Day and Date : Monday, 13-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All** questions are **compulsory**.
2) Draw **neat** diagrams **wherever** necessary.
3) Figures to the **right** indicates **full** marks.

1. Fill in the blanks with correct answer from the given options : **10**
- 1) National mineral policy of India is referred to _____
(1990, 1995, 1996, 1998)
 - 2) India is major producer of _____ ore.
(petroleum, iron, uranium, platinum)
 - 3) _____ is renewable, hence is easy for conservation.
(copper, sulphur, uranium, coal)
 - 4) Syngenetic ore deposits are formed _____, the host rock formed.
(before, simultaneously, after, after some time)
 - 5) Goa shows presence of _____ ore.
(gold, copper, sulphur, iron)
 - 6) _____ concentration is a process of natural gravity separation of heavy minerals from light minerals.
(chemical, mechanical, laired, metasomatic)
 - 7) The magmatic deposits often formed due to crystallization of early formed valuable minerals under effect of gravitation are called _____ deposits.
(intrusion, injection, dissemination, segregation)
 - 8) The heavy minerals occurring as placers possess high specific gravity and high _____.
(volume, mass, shine, durability)
 - 9) In supergene enrichment _____ plays important role.
(gravity, ground water, hydrothermal solution, wind)
 - 10) Mechanical concentration is the process of formation of _____ deposits.
(placer, coal, radioactive, light weight)

P.T.O.



2. Answer **any five** of the following : **10**
- 1) Describe Laterite.
 - 2) Ore deposits of Karnataka.
 - 3) Saddle reef and Ladder vein.
 - 4) Immiscible liquid segregation.
 - 5) Common placer deposits of Maharashtra.
 - 6) Who should be made aware about the mineral conservation ?
3. A) Answer **any two** of the following : **6**
- 1) Supergene enrichment process.
 - 2) Late magmatic deposition process.
 - 3) Concept of conservation of minerals.
- B) Contact metasomatism. **4**
4. Answer **any two** of the following : **10**
- 1) Define hydrothermal deposits. Describe stock work, crustification.
 - 2) What are magmatic mineral deposits ? Describe early magmatic deposits.
 - 3) Describe in detail the process of residual concentration.
5. Explain **any two** of the following : **10**
- 1) National Mineral Policy.
 - 2) Limitations of mineral conservation.
 - 3) Describe sedimentary origin of ores. Give Indian examples.
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Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
MICROBIOLOGY (Special Paper – XVI)
Medical Microbiology

Day and Date : Monday, 13-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

Instructions : 1) *All questions are compulsory.*
2) *Figures to right indicate full marks.*

1. Choose the correct alternative and rewrite the sentence again. 10
- i) Incubation period of hepatitis B virus is _____
a) 2 – 6 weeks b) 2 – 6 months
c) 2 – 6 years d) 6 – 10 days
 - ii) Antimicrobial action of vancomycin antibiotic is by inhibiting _____ synthesis.
a) Cell membrane b) Nucleic acid
c) Protein d) Cell Wall
 - iii) _____ is not a viral disease.
a) Syphilis b) Rabies
c) Hepatitis A d) HIV
 - iv) Swarming growth on agar medium is characteristic feature of _____
a) Vibrio cholerae b) Proteus Vulgaris
c) Escherichia Coli d) Pseudomonas aeruginosa
 - v) Escherichia Coli is _____
a) Gram negative motile rods b) Gram positive non-motile rods
c) Gram negative non-motile rods d) Gram positive motile rods
 - vi) Amphotericin B and Clotrimazole can be used in treatment of _____
a) Malaria b) Candidiasis
c) Vibrio d) Herpes simplex
 - vii) Presence of negri bodies in the brain is sign of _____
a) Herpes b) Rabies
c) HIV d) Hepatitis A



- viii) Which of the following organism can cause urinary tract infection ?
- a) Mycoplasma Pneumoniae b) Clostridium perfringens
 c) Proteus vulgaris d) Treponema Pallidum
- ix) Sulphonamides are inhibitor of _____ synthesis.
- a) Folic acid b) Vitamin B₁₂
 c) Protein d) Peptidoglycan
- x) Helicobacter Pylori causes _____
- a) Gastric lymphoma
 b) Gastric and duodenal ulcer
 c) Hyperacidity
 d) All of these

2. Answer/Define **any five** of the following : **10**
- a) Beta-lactamase
 b) Pauci bacillary leprosy
 c) Significance of germ tube test
 d) Mode of action of tetracycline
 e) Mode of action of Azidothymidine
 f) Acid fast staining
 g) Opportunistic infections in HIV.
3. A) Answer **any two** of the following : **6**
- a) Cultural and biochemical characters of Klebsiella species
 b) Prevention of Cholera
 c) Spread of rabies.
- B) Write in brief on “Properties of ideal antibiotic”. **4**
4. Answer **any two** of the following : **10**
- a) Drugs acting on folic acid biosynthesis.
 b) Explain with example, inactivation of drugs leads to drug resistance.
 c) Tests to guide chemotherapy.
5. Answer **any two** of the following : **10**
- a) Differentiate between Hepatitis A and B
 b) Symptoms of herpes
 c) Diagnosis of Helicobacter pylori infection.
-



Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
ELECTRONICS (Special Paper – XVI)
Advanced Electronics Technology

Day and Date : Monday, 13-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labelled diagrams wherever necessary.**
4) **Use of log table and calculator is allowed.**

1. Select the correct alternative for the following : 10

- 1) The VHDL supports _____ description style.
 - a) Structural
 - b) Behavioral
 - c) Dataflow
 - d) All of these
- 2) Logic array back contains several
 - a) LUT
 - b) Macrocell
 - c) PIA
 - d) None of these
- 3) PLD are used to replace _____ logic devices.
 - a) Fixed functions
 - b) Variable functions
 - c) TTL
 - d) CMOS
- 4) The paletter in Lab VIEW helps to _____ VI.
 - a) Copy and run
 - b) Create and run
 - c) Copy and paste
 - d) None of these
- 5) Lab VIEW is acronym for
 - a) Laboratory Virtual Instrument Engg. Workbench
 - b) Laboratory Virtual Instrument Engg. Workshop
 - c) Laboratory Virtual Instrument Engg. Work
 - d) All of these



- 6) Entity is the description of the interface
- a) of outside environment
 - b) of inside environment
 - c) between design and external environment
 - d) none of these
- 7) The _____ is the major problem due to increase in device density.
- a) reliability
 - b) heat dissipation
 - c) power consumption
 - d) none of these
- 8) The Si and Ge has _____ bandgap type of semiconductor.
- a) direct
 - b) indirect
 - c) both a and b
 - d) none of these
- 9) The RTD has a maximum frequency of up to
- a) 2.2 THz
 - b) 2.2 GHz
 - c) 215 GHz
 - d) 215 THz
- 10) SET is acronym for
- a) Single Electron Transfer
 - b) Single Electron Transistor
 - c) Single Electron Transmission
 - d) All of these

2. Answer **any five (2 marks each)** :

10

- 1) State the importance of nano electronics.
- 2) Draw the sketch of nanotube FET.
- 3) Write the VHDL code for NAND gate entity.
- 4) Classify the PLD devices.
- 5) State the advantages of LabVIEW.
- 6) State the advantages of PLD.



3. A) Answer **any two (3 marks each)** : **6**
- 1) Explain the graphical system design.
 - 2) Explain PAL.
 - 3) Describe carbon nanotube.
- B) Explain architecture in VHDL with suitable example. **4**
4. Answer **any two (5 marks each)** : **10**
- 1) Write the VHDL code for 4 to 1 multiplexer.
 - 2) Explain single electron transistor.
 - 3) Explain energy band in semiconductor.
5. Answer **any one** : **10**
- 1) Explain FPGA in detail.
 - 2) Explain software environment in LabVIEW.
-



Seat No.	
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B.Sc. – III (Semester – VI) Examination, 2015
COMPUTER SCIENCE (Special Paper – XVI)
Data Communication and Networking – II

Day and Date : Monday, 13-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose correct alternative : 10
- i) _____ operate as an intermediary between a local network and services available on the internet.
 - a) Web server
 - b) Ftp server
 - c) Proxy server
 - d) News server
 - ii) For transferring big files over the internet the _____ protocol is used.
 - a) POP
 - b) IP
 - c) SMTP
 - d) HTTP
 - iii) A _____ can understand multiple networking protocols.
 - a) Repeater
 - b) Bridge
 - c) Router
 - d) Gateway
 - iv) _____ can be used to create specific partitions in Linux.
 - a) GNOME
 - b) KDE
 - c) RAID
 - d) None of the above
 - v) _____ server uses distributed file service.
 - a) Print
 - b) File
 - c) Web
 - d) Database
 - vi) _____ protocol is used for transferring mails on the internet.
 - a) POP
 - b) IP
 - c) SMTP
 - d) HTTP
 - vii) A repeater takes a weakend signal and _____ it.
 - a) Amplifies
 - b) Regenerates
 - c) Resamples
 - d) Reroutes



- viii) A cipher is
- a) An encryption algorithm b) A decryption algorithm
c) A private key d) None of the above
- ix) HTTP is called as _____ protocol.
- a) Stateful b) Stateless
c) Connectionless d) None of the above
- x) _____ is a webserver of windows server 2003.
- a) IIS b) Apache c) Tomcat d) FTP

2. Answer **any five** of the following : **10**
- 1) What is meant by piconet ?
 - 2) Which are the various web server protocols in Windows Server 2003 ?
 - 3) What is an active hub ?
 - 4) Which are the various FTP servers in Linux ?
 - 5) What is meant by plaintext and Cipher key ?
 - 6) What is proxy ARP ?
3. a) Answer **any two** of the following : **6**
- 1) What is the use of SMTP ? Explain in detail.
 - 2) What is meant by message non repudiation ?
 - 3) Explain repeater in detail.
- b) Explain database server of Windows Server 2003. **4**
4. Answer **any two** of the following : **10**
- 1) Explain VPN in detail.
 - 2) Explain Tux server in detail.
 - 3) Explain proxy firewall in detail.
5. Answer **any two** of the following : **10**
- 1) Explain POP3 protocol in detail.
 - 2) Explain CUPS printer server in detail.
 - 3) Explain HTTP in detail.
-



Seat No.	
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B.Sc. – I (Semester – I) Examination, 2015
MATHEMATICS (Old)
Calculus (Paper – II)

Day and Date : Saturday, 18-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

N.B. : i) **All questions are compulsory.**
ii) **Figures to the right indicate full marks.**

1. Select the correct alternative for **each** of the following : **10**

1) $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{x} = \underline{\hspace{2cm}}$

- a) 1 b) $\frac{3}{2}$ c) $\log 3$ d) $\log\left(\frac{3}{2}\right)$

2) If $y = 3^{mx}$ then $y_n = \underline{\hspace{2cm}}$

- a) $3^{mx} \cdot (\log 3)$ b) $m^n 3^{mx} (\log 3)^n$
c) $3^{mx} \cdot (\log 3)^n$ d) $m^n 3^{mx}$

3) If $y = \log(ax + b)$ then $y_n = \underline{\hspace{2cm}}$

- a) $\frac{(-1)^n (n-1)! a^n}{(ax+b)^n}$ b) $\frac{(-1)^{n-1} n! a^n}{(ax+b)^n}$
c) $\frac{a^n}{(ax+b)^n}$ d) $\frac{a^n}{(ax+b)^{n+1}}$

4) Series expansion of e^x is $\underline{\hspace{2cm}}$

- a) $1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + \dots \infty$ b) $1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \infty$
c) $1 + x + x^2 + x^3 + \dots \infty$ d) $1 - x + x^2 - x^3 + \dots \infty$



5) Series expansion of $\sin x$ is _____

a) $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots \infty$

b) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots \infty$

c) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \infty$

d) $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots \infty$

6) The value of $\int_0^{\pi/2} \sin^5 x \, dx =$ _____

a) $\frac{8}{15}$

b) 8

c) 15

d) $\frac{1}{15}$

7) If $\phi = x^2 + y^2 + z^2$ then $\text{grad } \phi =$ _____

a) $x\vec{i} + y\vec{j} + z\vec{k}$

b) $2x + 2y + 2z$

c) $2x\vec{i} + 2y\vec{j} + 2z\vec{k}$

d) $x\vec{i} + y\vec{j} + 2z\vec{k}$

8) If $\vec{f} = x\vec{i} + y\vec{j} + z\vec{k}$ then $\text{curl } \vec{f} =$ _____

a) $x\vec{i} - y\vec{j} + z\vec{k}$

b) $x\vec{i} + y\vec{j} - z\vec{k}$

c) $\vec{0}$

d) none of these

9) The degree of homogenous function $u = \frac{x^3 + y^3}{x^2 + y^2}$ is _____

a) 0

b) 1

c) -1

d) 2

10) If $f(x, y) = 2x^2 - xy + 2y^2$ then $\frac{\partial f}{\partial x}$ at $(1, 2) =$ _____

a) 0

b) -2

c) -1

d) 2



2. Attempt **any five** from the following : 10

1) Evaluate $\lim_{x \rightarrow a} \frac{\log(x-a)}{\log(e^x - e^a)}$.

2) Find n^{th} derivative of $y = \frac{x}{x^2 - a^2}$.

3) Show that $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots \infty$.

4) Discuss the continuity of $f(x, y)$ at $(0, 0)$ where

$$f(x, y) = \frac{x^2 - y^2}{x^2 + y^2}, \quad (x, y) \neq (0, 0)$$
$$= 0, \quad \text{otherwise.}$$

5) Evaluate $\int_0^{\pi} \sin\left(\frac{x}{2}\right) dx$.

6) If $\vec{F} = 2x^2z\vec{i} - xy^2z\vec{j} + 3yz^2\vec{k}$, find $\text{div}\vec{F}$.

3. A) Attempt **any two** of the following : 6

1) Find n^{th} derivative of $x^3 \cdot e^x$.

2) If f and g are scalar point functions then prove that $\text{grad}(f + g) = \text{grad } f + \text{grad } g$.

3) If $z = \log(x^2 + y^2)$ then show that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$.

B) If $u = \tan^{-1}\left(\frac{x^3 - y^3}{x + y}\right)$, then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$. 4



4. Attempt **any two** of the following :

10

1) Evaluate $\int_0^{2a} x^3(2ax - x^2)^{3/2} dx$.

2) If u is homogenous function of degree n in x and y then prove that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = nu.$$

3) If $y = (\sin^{-1}x)^2$ then prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$.

5. Attempt **any one** of the following :

10

1) State and prove Leibnitz's theorem and hence if $x = \tan(\log y)$ then prove that

$$(1 + x^2)y_{n+1} + (2nx - 1)y_n + n(n - 1)y_{n-1} = 0.$$

2) If $z = f(x, y)$ is a homogenous function of degree n , then prove that

$$x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} = n(n - 1)z \text{ and if } u = \log \left(\frac{x^3 + y^3}{x^2 + y^2} \right) \text{ then show}$$

that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$.



SLR-R – 3

Seat No.	
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B.Sc. I (Semester – I) Examination, 2015
(CGPA Pattern)
COMPUTER SCIENCE (Paper – I)
(Computer Fundamentals and Programming using C – I)

Day and Date : Tuesday, 7-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

N.B. : 1) All questions are compulsory.
2) Use different answer paper for separate Section.

SECTION – I

(Computer Fundamentals)

1. Multiple choice questions. 5
- 1) Light pen is _____ device.
a) Pointing b) Storage c) Scanning d) None
- 2) All 8 bit coding system to represent characters in modern computers.
a) BCD b) EBCDIC c) ASC II d) Octal
- 3) _____ is printer on which characters to printed are embossed.
a) Laser b) Inkjet
c) Drum Printer d) Dot matrix
- 4) Scanner is _____ device.
a) input b) output c) printing d) display
- 5) Base of binary is
a) 16 b) 8 c) 2 d) 10
2. Answer **any five** of the following. 10
- i) VLSI is used in which generation of computer.
- ii) Write definition of operating system and types of operating system.

P.T.O.



iii) Convert following :

$$(110110)_2 = (?)_{10}$$

iv) Convert following

$$(8964)_{10} = (?)_{16}$$

v) Explain in short MICR.

vi) Solve following

$$(7\ FF.8)_{16} = (?)$$

vii) $(1010) \times (1011) = (?)_{10}$

3. A) Write short notes on **any two** of the following. 10
- i) Differentiate High level language and Low level language.
 - ii) Explain features of operating system.
 - iii) List different types of primary memory and explain two of them.
- B) Answer **any one** of the following. 10
- i) Explain generation of computer.
 - ii) Explain secondary storage devices.

SECTION – II

(Programming Using C – I)

1. Multiple choice questions. 5
- 1) _____ is symbols which works on operand.
- a) Keyword b) Identifier c) Character set d) Operator
- 2) _____ is Pictorial representation of algorithm.
- a) Function b) One dimensional array
c) Pseudo code d) Flow chart
- 3) To alter the flow of program _____ are used.
- a) Decision making control b) Looping controls
c) Array d) Constants



- 4) _____ are used to abort the block.
a) continue b) break c) goto d) label
- 5) Predefined functions are used to find out given input is digit or not.
a) is upper () b) is lower () c) is char () d) is digit

2. Answer **any five** of the following. **10**

- i) Explain keywords.
- ii) Explain break and continue.
- iii) Explain ternary i.e. ? : operator with example.
- iv) Predict the output
int a = 6, b = 2;
print f ("%d", a +++++b).
- v) Write a program to find out maximum no. among three no.
- vi) Explain bitwise operator.
- vii) List out rules for defining identifiers.

3. A) Write short notes on **any two** of the following. **10**

- i) Explain array and its types.
- ii) Write a program to find out given no. is prime or not prime.
- iii) Differentiate while and do-while.

B) Answer **any one** of the following. **10**

- i) Write a program to transpose the matrix.
 - ii) Write a program to check entered string is Palindrome or not Palindrome.
-



Seat No.	
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B.Sc. – I (Semester – I) (Old) Examination, 2015
BOTANY (Paper – II)
Plant Physiology and Horticulture

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) **Draw neat labelled diagrams wherever necessary.**
3) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by choosing correct alternatives : **10**
- 1) _____ is a artificial method of vegetative propagation.
a) Runner b) Offset c) Stolon d) Cutting
 - 2) The elements are required by the plants in little proportion are called _____
a) Micro elements b) Macro elements
c) Radio active elements d) Trace elements
 - 3) _____ is the growth retardent.
a) IBA b) IAA c) CCC d) GA
 - 4) In Holoenzyme, the prosthetic group is organic is called _____
a) Apoenzyme b) Co-enzyme c) Co-factor d) Isoenzyme
 - 5) _____ is a branch of horticulture.
a) Pomoculture b) Agriculture c) Sericulture d) All of these
 - 6) The vegetative growth of plant is maximum in the _____ phase.
a) Lag b) Linear c) Steady d) Death
 - 7) The enzymes are active in narrow range of _____
a) Temperature b) Light c) Substrate d) Product
 - 8) _____ is a variety of rose.
a) Hybrid teas b) Damaskas c) Marigold d) Pusa



- 9) Tuber is a _____ method of vegetative propagation.
a) Artificial b) Natural c) Scientific d) None of these
- 10) _____ is a portion of rooted plant on which bud or portion of branch inserted.
a) Scion b) Stolon c) Callus d) Stock

2. Answer **any five** of the following : **10**

- i) What are macro elements ?
- ii) Define olericulture.
- iii) What photoperiodism ?
- iv) Define enzyme.
- v) Enlist the types grafting.
- vi) Explain runners.

3. A) Answer **any two** of the following : **6**

- i) Merits and demerits of vegetative propagation.
- ii) Describe co-enzymes with example.
- iii) Role of phytochrome pigments in physiology of flowering.

B) Define horticulture and its branches. **4**

4. Answer **any two** of the following : **10**

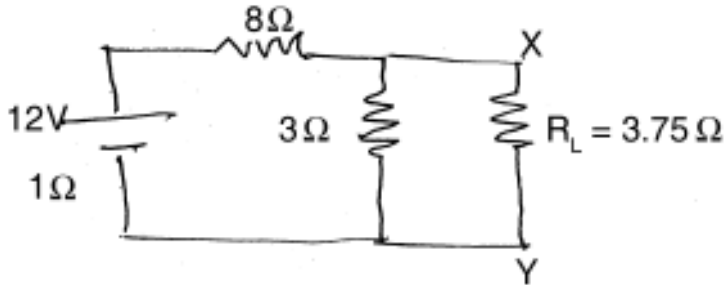
- i) Air layering
- ii) Role and deficiency symptoms of Fe
- iii) Applications of CCC in agriculture.

5. Answer **any one** of the following : **10**

- i) What is budding ? Explain the types of budding.
 - ii) What are enzymes ? Describe the physicochemical structure of enzyme.
-



B) In the following circuit, find current through R_L by using Thevenin's Theorem. 4



4. Answer **any two** of the following : 10

- i) What is transformer ? What are its types ? Explain step down transformer.
- ii) Explain T-network.
- iii) Explain Maximum Power Transfer Theorem.

5. Answer **any one** of the following : 10

- i) Explain LCR series resonance circuit. Derive expression for resonance frequency and quality factor.
 - ii) Explain sinusoidal and nonsinusoidal current and voltage source. Define time period and frequency.
-



Seat No.	
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B.Sc. I (Semester – I) (Old) Examination, 2015
GEOLOGY (Paper – I)
Mineralogy and Palaeontology

Day and Date : Monday, 20-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B.** :1) *All questions are compulsory.*
2) *Figures to the **right** indicate **full** marks.*
3) *Draw neat diagrams **wherever** needed.*

1. Fill in the blanks with correct answer from the given option. **10**

- 1) Quartz shows _____ fracture.
a) Earthy b) Conchoidal c) Hackly d) Even
- 2) Mineral Phlogopite belongs to _____ group.
a) Amphibole b) Mica c) Silica d) Olivine
- 3) Hardness of calcite is
a) 1 b) 3 c) 4 d) 5
- 4) Olivine occur in _____ rock.
a) Pegmatite b) Granite c) Dunite d) Limestone
- 5) Asbestos shows _____ luster.
a) Vitreous b) Silky c) Pearly d) None of these
- 6) The shell of gastropod is
a) Uninvolved b) Bivalve c) Spiral d) Oval
- 7) Paradoxide is shell of
a) Gastropod b) Cephalopod c) Lamellibranch d) Arthropod
- 8) Fossil favosite belongs to _____ Phylum.
a) Echinodermata b) Mollusca
c) Arthropoda d) Coelentera



- 9) Coiling of physa is
 a) Dextral b) Sinistral c) Tight d) Oval
- 10) Petrification is the result of
 a) Silicification b) Carbonation
 c) All of these d) None of these

2. Answer **any five** from the following : **10**

- 1) Streak of the mineral
- 2) Physical properties of mica group of mineral
- 3) Luster of mineral
- 4) Pygidium of trilobite
- 5) Mould and cast
- 6) Uses of fossils.

3. A) Answer **any two** : **6**

- 1) Process of fossilization
- 2) Hardness of mineral
- 3) Structure and composition of pyroxene group.

B) Explain mode of preservation of fossil. **4**

4. Answer **any two** of the following : **10**

- 1) Describe the Amphibole mineral group.
- 2) Explain the fracture and cleavages of minerals.
- 3) Describe mica group.

5. Answer **any two** of the following : **10**

- 1) Describe the class gastropoda
- 2) Calceola and Montivaltia
- 3) Describe the morphology of Echinodermata.



3. A) Answer in brief (**any two**) : **6**
- i) Structure and function of pili.
 - ii) General characters of viruses.
 - iii) Functions of cell membrane.
- B) Draw a well labelled diagram of typical eukaryotic cell. **4**
4. Answer **any two** of the following : **10**
- i) Cellwall of gram positive bacteria.
 - ii) Beneficial activities of bacteria.
 - iii) General characteristics of Rickettsia.
5. Answer **any two** of the following : **10**
- i) Explain general principles of bacterial nomenclature.
 - ii) General characters of Actinomycetes.
 - iii) Describe in detail structure of flagella.
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Seat No.	
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B.Sc. – I (Semester – I) Examination, 2015
ELECTRONICS (Paper – II) (Old)
Digital Fundamentals

Day and Date : Tuesday, 21-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B. :** 1) *All questions are compulsory.*
2) *Draw the figures wherever necessary.*

1. Select the correct alternative for the following : **10**

- 1) Hexadecimal number system has base _____
a) 2 b) 8 c) 10 d) 16
- 2) _____ gate is used as universal building block.
a) AND b) OR c) NAND d) Ex-OR
- 3) Half subtracter uses _____ gates.
a) AND, OR, INVERTER b) AND, OR, Ex-OR
c) AND, Ex-OR, INVERTER d) AND, NAND, Ex-OR
- 4) Which of following is not a octal number ?
a) 101 b) 125 c) 158 d) 777
- 5) In Boolean algebra $A \cdot \bar{A} =$ _____
a) 0 b) 1 c) \bar{A} d) A
- 6) 1^s compliment of binary number 1001 is _____
a) 1000 b) 0110 c) 0111 d) 0001
- 7) IC 7400 is _____ gate.
a) AND b) NAND c) NOR d) OR
- 8) Full Adder adds _____ bits at a time.
a) 1 b) 2 c) 3 d) 4



- 9) BCD is _____
- a) Binary Coded Decimal b) Binary converted Decimal
c) Binary Cancelled Decimal d) Binary Connected Decimal
- 10) Quad is group of _____ ones.
- a) One b) Two c) Three d) Four

2. Attempt **any five (5)** : **10**

- 1) What is binary number system.
- 2) Draw the pin diagram of IC 7404.
- 3) Draw the diagram with gates for $Y = A \cdot B + \overline{A} \cdot \overline{B}$.
- 4) Write the truth table for equation $Y = A\overline{B} + \overline{A}B$.
- 5) Convert Binary 10101010 in to decimal.
- 6) Define 1^s compliment and 2^s compliment of binary numbers.

3. A) Attempt **any two** : **6**

- 1) Explain AND gate using NAND gate.
- 2) State rules of OR and AND laws.
- 3) Explain how to bits are added using AND, Ex-OR gate.

B) Prove DeMorgans theorem **4**

$$\overline{A+B} = \overline{A} \cdot \overline{B} \text{ and } \overline{A \cdot B} = \overline{A} + \overline{B}$$

4. Attempt **any two** : **10**

- a) Solve the:
 - i) $(1011)_2 + (1011)_2$ ii) $(1011)_2 - (1000)_2$
- b) Explain double dabble method hence convert $(75)_{10}$ in to binary.
- c) How Ex-OR gate is used as a controlled inverter.

5. Attempt **any one** : **10**

- a) How Karnaugh map is constructed for 4 variables ? Solve the equation using K-map.
 $Y = \overline{A}B\overline{C} + \overline{A}BC + ABC + A\overline{B}C$
- b) Explain any five logic gates using their symbol, truth tables.



Seat No.	
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**B.Sc. – I (Semester – I) (Old) Examination, 2015
GEOLOGY (Paper – II)
Igneous, Sedimentary and Metamorphic Petrology**

Day and Date : Tuesday, 21-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever needed.**

1. Fill in the blanks with correct answer from the given option : **10**
- 1) _____ texture is formed in two stages in the formation of igneous rock.
a) Graphic b) Glassy c) Granitic d) Porphyritic
 - 2) _____ is the monomineralic rock.
a) Dunite b) Granite c) Basalt d) Dolerite
 - 3) Dyke is _____ type of forms of igneous rock.
a) Concordant b) Discordant c) Extrusive d) None of these
 - 4) _____ is the igneous rock structure.
a) Ripple mark b) Pisolitic c) Flow d) All of these
 - 5) Quartzite is _____ rock.
a) Igneous b) Sedimentary
c) Metamorphic d) None of these
 - 6) Bauxite is _____ type of sedimentary deposit.
a) Rudaceous b) Arenaceous c) Silt d) Residual
 - 7) Sedimentary rock shows _____ structure.
a) Granitic b) Bedding c) Granulose d) Glassy
 - 8) Marble is _____ rock.
a) Metamorphic b) Igneous c) Sedimentary d) None of these
 - 9) Gneissose structure is formed due to _____ metamorphism.
a) Plutonic b) Thermal
c) Dinamothermal d) None of these
 - 10) _____ is the agent of metamorphism.
a) Heat b) Pressure c) Fluid d) All of these



2. Answer **any five** from the following : **10**
- 1) Antistress minerals.
 - 2) Agents of metamorphism.
 - 3) Oolitic structure.
 - 4) Cross bedding structure.
 - 5) Pyrogenetic minerals.
 - 6) Sills.
3. A) Answer **any two** : **6**
- 1) Glassy texture.
 - 2) Laterite.
 - 3) Cataclastic metamorphism.
- B) Describe the divisions of rocks. **4**
4. Answer **any two** of the following : **10**
- 1) Describe the discordant forms of igneous rock.
 - 2) Structures of metamorphism.
 - 3) Describe mud crack and rainprint structure.
5. Answer **any two** of the following : **10**
- 1) Describe the types of metamorphism.
 - 2) Classification of sedimentary rock.
 - 3) Describe the structures of igneous rock.
-



Seat No.	
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B.Sc. – I (Sem. – I) (Old) Examination, 2015
MICROBIOLOGY
Paper – II : Microbial Techniques

Day and Date : Tuesday, 21-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw diagrams wherever necessary.**

1. Rewrite the following sentences by selecting appropriate alternative : **10**
- 1) Reflection of light rays is the function of _____ of compound microscope.
a) condensor b) objective c) eyepiece d) mirror
 - 2) The source of illumination in electron microscope is _____
a) beam of electrons b) sunlight
c) radiowaves d) all of above
 - 3) _____ is acidic stain.
a) Basic fuchsin b) Malachite green
c) Nigrosin d) Methylene blue
 - 4) _____ is used as mordant in Gram Staining.
a) Alcohol b) Iodine
c) Crystal violet d) Basic fuchsin
 - 5) The process of killing pathogenic microbes is known as _____
a) sterilization b) disinfection c) sanitization d) microbiostasis
 - 6) Petri plates are sterilized _____
a) by boiling in water bath b) by tyndallization
c) by dry heat in hot air oven d) in incubator
 - 7) MacConkey's agar is _____
a) selective medium
b) differential medium
c) selective as well as differential medium
d) enriched medium



Seat No.	
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B.Sc. – I (Sem. – II) (New) (CGPA Pattern) Examination, 2015
ENGLISH COMPULSORY
On Track : English Skills for Success

Day and Date : Wednesday, 22-4-2015

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Rewrite the following sentences by choosing the correct alternative given below
each :

14

- 1) Some people described Dr. Kalam as
 - a) A visionary man
 - b) A rocket man
 - c) A missile man
 - d) A workaholic
- 2) Wernher Von Braun advised Dr. A.P.J. Abdul Kalam to make rocketry his mission and
 - a) Profession
 - b) Glory
 - c) Religion
 - d) Division
- 3) Who represented the Jains at the parliament of religions ?
 - a) Vivekananda
 - b) Mahatma Gandhiji
 - c) Protap Chunder Mozoomdar
 - d) Annie Besant
- 4) The parliament of religions was to be held in
 - a) America
 - b) Singapore
 - c) Canada
 - d) South Africa
- 5) The primary idea of human rights involves
 - a) Rights of the government
 - b) Rights for the government
 - c) Right formulated by the government
 - d) Rights to operate against the government



- 6) The main reason of the serious economic problems of the majority is
- a) Famine
 - b) Negligence
 - c) Drought
 - d) Ignorance
- 7) The poem “Brahma” displays the influence of _____ on Emerson.
- a) The Vedas
 - b) The Upanishads
 - c) The Geeta
 - d) The Puranas
- 8) The last two lines of the poem “Brahma” are addressed to those persons who are
- a) The devotees of Lord Brahma
 - b) The selfless servants of humanity
 - c) The rulers of the world of man
 - d) The persons in charge of administration
- 9) The poet, in “Full Moon” gives expression to
- a) The feeling of pity for the moon
 - b) The feeling of concern for the lovers
 - c) The feeling of joy for the scientists
 - d) The feeling of joy for the moon
- 10) The moon has been depicted as _____ by the poet.
- a) A challenge
 - b) A threat
 - c) A comfort
 - d) A culprit
- 11) The poetry of _____ is a wonderful example of romantic poetry.
- a) Keats
 - b) Keat’s
 - c) Keats’
 - d) Keats’s
- 12) Peacock is one of the _____ birds found in India.
- a) More wonderful
 - b) Wonderful most
 - c) Most wonderful
 - d) Only wonderful
- 13) The god _____ was pleased with Jesus Christ.
- a) Al mighty
 - b) All mighty
 - c) All my tea
 - d) None of the above
- 14) Who won the race ? The _____ or the tortoise ?
- a) Here
 - b) Hare
 - c) Hair
 - d) Higher



2. Answer **any seven** of the following questions in **two to three** sentences **each** : **14**
- 1) What had Dr. Kalam successfully tested while in France ?
 - 2) What kind of a personality was Von Braun, according to Dr. Kalam ?
 - 3) What was the response of the chief of an official religious society when Vivekananda wrote to them for help ?
 - 4) Who were the other Indians present at the parliament of religions ?
 - 5) What do you understand by human rights ?
 - 6) What, in your opinion, is the message of the poem 'moon' ?
 - 7) What is the central theme of the poem "Brahma" ?
 - 8) Who were the 'watchers of the moon' ? What happened to them ?
3. A) Write short answers on **any two** of the following : **8**
- 1) What do you learn of Dr. Kalam's dedication to team work through the 'essay' work brings solace ?
 - 2) Summarise the trials and tribulations that Vivekananda faced in America prior to his address at the parliament of Religions ?
 - 3) Show how the awareness of human rights has seeped in everywhere and people are more aware of the issue.
- B) Answer **any two** of the following questions briefly : **6**
- 1) What is an agenda ?
 - 2) What should we avoid in preparing our C.V. ?
 - 3) What is an E-mail ?
4. You are the secretary of the Bharat Sports Club in your town. The meeting of the office-bearers of the club is scheduled for the 15th on next month. Prepare an agenda for the meeting and then draft the minutes of the meeting using the format of the given specimens. **14**
- OR
- You are Prerna Pai living at 24, Marigold Apartments, Indira Nagar, Bengaluru and you have just received a letter of appointment as Assistant Executive in the accounts department of Samtron Industries, 124, Shubham Complex, M. G. Road, Bengaluru. The letter is dated 10 August, 2009 and the sender is MR. Manu Bhat, General Manager.
5. Write a suitable C.V. for the post of a clerk in Bank. **14**
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Seat No.	
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B.Sc. – I (Sem. – I) Examination, 2015
PHYSICS (Paper – I) (CGPA Pattern)
Mechanics, Properties of Matter and Optics and Laser

Day and Date : Monday, 13-4-2015

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- Instructions :**
- 1) **All questions are compulsory.**
 - 2) Figures to the **right** indicate **full** marks.
 - 3) Figures must be drawn **wherever** necessary.
 - 4) Use of logarithmic table and calculator is **allowed**.
 - 5) **Two** Sections should be written in **separate** answer book.

SECTION – I

(Mechanics and Properties of Matter)

1. Select the correct alternative from the following : 5

- 1) Moment of inertia of rectangular lamina about an axis through its centre and parallel to one of its side is

a) $I = M \left(\frac{l^3}{3} + \frac{b^2}{12} \right)$

b) $I = \frac{M(l^2 + b^2)}{12}$

c) $I = \frac{Mb^2}{12}$

d) $I = \frac{Mb^2}{3}$

- 2) The angular acceleration of compound pendulum is directly proportional to its

a) Linear displacement

b) Mass

c) Angular displacement

d) Force

- 3) The profile of the advancing liquid in the capillary tube is a

a) parabola

b) hyperbola

c) catenary

d) ellipse



- 4) In atomiser, the fall in pressure, occurs due to
- increase in velocity
 - decrease in velocity
 - increase in pressure
 - decrease in temperature
- 5) The value of Young's modulus $\gamma = 20 \times 10^{10} \text{ N/m}^2$ and modulus of rigidity $\eta = 8 \times 10^{10} \text{ N/m}^2$ for iron then the value of Poisson's ratio is
- 0.25
 - 0.5
 - 1
 - 0.1

2. Answer **any five** of the following :

10

- Define radius of gyration.
- Define centre of suspension and centre of oscillation.
- What is torsional pendulum ?
- Define Young's modulus and modulus of rigidity.
- Explain equation of continuity.
- State any two factors affecting surface tension.
- The excess pressure inside a soap bubble of radius 1 cm is balanced by that due to a column of oil 2 mm high. Find the surface tension of the soap solution, if density of oil is 800 kg/m^3 .

3. A) Write short notes on **any two** of the following :

10

- Moment of inertia of flywheel.
- Surface tension by Jaeger's method.
- Water is escaping from a tank through a horizontal capillary tube 0.2 m long and 1.2 mm in diameter, when it stands 1 m above the tube. At what rate is water escaping ?
Given : η for water is 0.001 N.sec/m^2 .

B) Answer **any one** of the following :

10

- Derive relation betⁿ elastic constants γ , η and K.
- What is Bifilar pendulum ? Discuss theory of Bifilar pendulum.



SECTION – II
(Optics and Laser)

1. Select and write the most appropriate answer from the given alternatives for **each** subquestion.

5

i) A combination of two thin lenses made by same material having focal length f_1 and f_2 co-axially separated by the finite distance d be achromatic combination if d is equal to

a) $f_1 + f_2$

b) $f_1 - f_2$

c) $\frac{f_1 + f_2}{2}$

d) $\frac{f_1 - f_2}{2}$

ii) The value of ratio of the focal length of eye lens and field lens used in Ramsden's eye-piece is

a) 1

b) 2

c) 3

d) 4

iii) In grating spectra, an angle of diffraction

a) directly proportional to square of wavelength

b) remains constant with change of wavelength

c) decreases with increase of wavelength

d) increases with increase of wavelength

iv) Helium-Neon is

a) semiconductor laser

b) gas laser

c) liquid-dye laser

d) crystalline solid state laser

v) If $\angle i = 35^\circ$ then an angle made by the reflected ray of light with the surface of a parallel faced thin film is

a) 55°

b) 45°

c) 40°

d) 35°



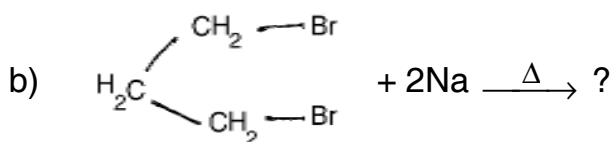
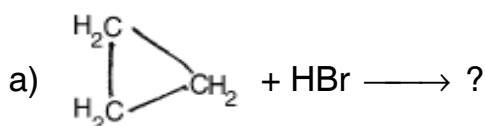
2. Answer **any five** of the following : 10
- i) State Fermat's principle of extremum time.
 - ii) Write an expression for axial chromatic aberration.
 - iii) What is a crossed lens ? State the use of it.
 - iv) Define the term : Einstein's coefficient of absorption of radiation.
 - v) State any two characteristics of a laser beam.
 - vi) Write the names of different parts of an optical instrument : Spectrometer.
 - vii) If focal length of Huygen's Eye-Piece is 12 cm. Calculate the focal length of eye lens and field lens.
3. A) Answer **any two** of the following : 10
- i) Describe the construction and working of Ruby Laser.
 - ii) Draw a neat ray diagram of Ramsden's Eye-piece and derive an expression for focal length of it.
 - iii) Two thin lenses made by same material having focal length f_1 and f_2 co-axially separated by distance d forms a combination of focal length 50 cm satisfies the condition of no chromatic aberration and minimum spherical aberration. Calculate the value of : f_1 , f_2 and d .
- B) Answer **any one** of the following : 10
- i) Obtain the condition of constructive and destructive interference for the reflected light along successively parallel paths from the surface of a parallel faced thin film.
 - ii) How to prepare the replica of a original plane diffraction grating ? Describe an experiment of plane diffraction grating to determine the value of grating element. Calculate the maximum visible order of diffraction pattern of source of light of wavelength 5890 \AA obtained by the diffraction grating having 15000 lines per inch.
-



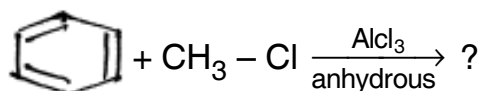
2. Answer **any five** of the following :

10

- i) Define carbocation and arynes.
- ii) What is racemic modification ? Why it is optically inactive ?
- iii) What are electrophiles and nucleophiles ?
- iv) Predict the products of following :



- v) Explain the term :
 - a) Anti-aromatic compounds
 - b) Non-aromatic compounds.
- vi) What is Huckel's rule of aromaticity ? Explain it with respect to naphthalene.
- vii) Complete the following reaction and name the reaction.



3. A) Write short notes on **any two** of the following :

10

- i) Addition reactions
- ii) Geometrical isomerism in maleic and fumaric acid.
- iii) Wurtz and Corey-House reaction.

B) Answer **any one** of the following :

10

- i) Explain mechanism involved in the dehydration of lower alcohol. What is the action of following reagent on ethylene ?
 - a) Br₂/CCl₄
 - b) HBr
 - c) Perbenzoic acid.
- ii) What is resonance effect ? What are necessary conditions for resonance ? Explain resonance effect with respect to phenol.



SECTION – II
(Analytical Chemistry)

4. Select the most correct alternative for the following and rewrite the sentences : 5
- i) Reciprocal of coefficient of viscosity is known as
a) Fluidity b) Viscosity c) Opacity d) Optical activity
 - ii) Carius method is used for estimation of _____
a) carbon b) nitrogen c) hydrogen d) halogen
 - iii) The process of removing extra common salt from the water is known as
a) purification b) desalination c) disinfection d) distillation
 - iv) In roasting, metal in the ore is converted into _____
a) atomic state b) sulphide c) oxide d) halide
 - v) Intensity of sound is measured in _____
a) dB b) OK c) ppm d) mg
5. Answer **any five** of the following : 10
- i) Mention the major constituent of milk.
 - ii) What are the important characteristics of an ideal antacid.
 - iii) Mention applications of distribution law.
 - iv) Draw a neat and labelled diagram of Wilfley table.
 - v) How sulphide ores can be concentrated ?
 - vi) Define the terms :
a) Environment
b) Biological oxygen demand.
 - vii) Give an account of health effect of No_x .
6. A) Write short notes on **any two** of the following : 10
- i) Major constituent in the plant.
 - ii) Theory of extraction.
 - iii) Blast furnace.
- B) Answer **any one** of the following : 10
- i) Define coefficient of viscosity. Describe determination of coefficient of viscosity by Ostwalds viscometer.
 - ii) What is empirical formula ? Discuss different steps involved in the determination of empirical formula of an organic compound. An aliphatic alcohol contains 52.4% carbon, 13.05% hydrogen. Determine its empirical formula.
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Seat No.	
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B.Sc. – I (Semester – II) (New CGPA Pattern) Examination, 2015
COMPUTER SCIENCE (Paper – II)
Computer Fundamentals and Programming Using ‘C’ – II

Day and Date : Friday, 24-4-2015

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- N.B. :** 1) **All questions are compulsory.**
2) Figures to the **right** place indicate **full** marks.
3) Answer of **two** Sections should be written in **separate** answer sheet.

SECTION – I
(Computer Fundamentals)

1. Choose correct alternatives : 5
- 1) _____ is extension of MS-Excel file.
a) .docx b) .doc c) .xls d) .xcel
 - 2) _____ communication allows data flow from both directions at same time
a) Full duplex b) Half duplex c) Simplex d) None of these
 - 3) _____ is place on image which is hyperlinked with other page.
a) Hot page b) Hot spot c) Hot Link d) None of these
 - 4) In _____ topology every node is connected with each other.
a) Ring b) Star c) Bus d) Mesh
 - 5) _____ Short cut key is used to cut selected text in MS-Word.
a) Ctrl+S b) Ctrl+F c) Ctrl+X d) Ctrl+Y
2. Answer **any five** of the followings : 10
- 1) What is Modem ?
 - 2) Explain the term “E-mail”.
 - 3) What is Spread Sheet ?



- 4) Write structure of HTML.
 - 5) Define-Multitasking.
 - 6) Describe the term “LAN”.
3. A) Attempt **any two** of the followings : 10
- 1) What is multiprocessing ? Explain it with its types.
 - 2) Explain table tag with its attributes.
 - 3) Write features of Windows Operating System.
- B) Attempt **any one** of the followings : 10
- 1) What is JavaScript ? Explain its different looping statements with example.
 - 2) What are the uses of spread sheet ? Explain different types of charts used in spread sheet.

SECTION – II

(Programming Using ‘C’ – II)

1. Choose correct alternatives : 5
- 1) By default ‘C’ function returns _____ type value.
a) char b) float c) void d) none of these
 - 2) Formal parameter uses _____ storage class defaultly.
a) auto b) static c) register d) extern
 - 3) _____ function updated previously allocated runtime memory.
a) malloc b) calloc c) realloc d) free
 - 4) Consider statement, `int *p,*q;`
Which of the following statement is correct ?
a) `p+q` b) `p – q` c) `p*q` d) `p%q`
 - 5) Memory of ‘structure’ and ‘union’ are same if both contains
a) More than two data members with same type
b) More than two data members with different type
c) Only one data member with same data type
d) Only one data member with different data type



2. Answer **any five** of the following : **10**
- 1) What is Preprocessor ? List out features of 'C' preprocessor.
 - 2) Write use and syntax of *calloc()* function.
 - 3) Define 'Nested Structure'.
 - 4) What is Pointer ? List out its applications.
 - 5) Write difference between 'Structure' and 'Union'.
 - 6) Write difference between 'call by value' and 'call by pointer'.
3. A) Attempt **any two** of the followings : **10**
- 1) Write a program to check number is prime or not using function.
 - 2) What is File ? Explain file opening modes in details.
 - 3) Explain 'Pointer to Pointer' with example.
- B) Attempt **any one** of the followings : **10**
- 1) Write a program to copy the content of one file into another file.
 - 2) Write a program that demonstrates passing entire structure to function.
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Seat No.	
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**B.Sc. – I (Sem. – II) Examination, 2015
New (CGPA Pattern)
PHYSICS (Paper – II)**

Heat and Thermodynamics, Electricity, Magnetism and Basic Electronics

Day and Date : Monday, 27-4-2015

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- Instructions :** 1) **Two** Sections should be written on **separate** answer books.
2) **All** questions are **compulsory**.
3) Figures to the **right** indicate **full** marks.
4) Draw **neat** diagrams **wherever** necessary.
5) Use of calculator/logarithmic table is **allowed**.

SECTION – I

(Heat and Thermodynamics)

1. Select the correct alternative :

5

i) The coefficient of viscosity of a gas is given by

a) $\eta = \frac{1}{3} \rho c \lambda$

b) $\eta = \frac{2}{3} \rho c \lambda$

c) $\eta = \frac{3}{4} \rho c \lambda$

d) $\eta = \rho c \lambda$

ii) In adiabatic demagnetization cooling method, the magnetic salt used was

a) Diamagnetic salt

b) Ferromagnetic salt

c) Paramagnetic salt

d) Ferrimagnetic salt

iii) The first law of thermodynamics is given by

a) $dQ = dU + PdV$

b) $dQ = dV - PdV$

c) $dQ = dU + VdP$

d) $dQ = dV - VdP$



SECTION – II

(Electricity, Magnetism and Basic Electronics)

1. Select correct alternative :

5

i) Time constant in series L-R circuit is

- a) $\frac{L}{R}$ b) $\frac{R}{L}$ c) LR d) $LRe^{j\omega}$

ii) In series L-C-R circuit the phase difference θ of the current with the applied alternating e.m.f. is

- a) $\tan \theta = \frac{(XL - XC)}{R}$ b) $\tan \theta = \frac{R}{(XL - XC)}$
c) $\tan \theta = \frac{R}{R + (XL - XC)}$ d) $\tan \theta = R(XL - XC)$

iii) Unit of figure of merit of a ballastic galvanometer is

- a) $\frac{mm}{\mu A}$ b) $\frac{\mu A}{mm}$ c) $\mu A \cdot mm^2$ d) $\mu A \cdot mm^3$

iv) Bridge rectifier is a _____ rectifier.

- a) Full wave b) Half wave
c) Ripple wave d) None of above

v) Current amplification factor in common base configuration is the ratio

- a) $\frac{\Delta I_E}{\Delta I_B}$ b) $\frac{\Delta I_B}{\Delta I_C}$ c) $\frac{\Delta I_C}{\Delta I_E}$ d) $\Delta E \times \Delta I_C$

2. Answer **any five** of the following :

10

i) Define the term resonance and write the condition of resonance in L-C-R series circuit.

ii) Define the term :

- i) figure of merit
ii) current sensitivity of balastic galvanometer.

iii) Calculate the value of resistance must be connected in series with inductance of 10 mH so that the circuit has time constant of 2.5×10^{-3} sec.



- iv) State Biot and Savart's law.
- v) What are the active and passive elements in electronic circuit ? Write atleast one example of each.
- vi) Draw the circuit diagram of Bridge rectifier with π filter.
- vii) Calculate the current amplification factor (β) of C.E. mode if the current amplification factor (α) is 0.99.

3. A) Answer **any two** of the following : **10**

- i) Derive an expression for growth of current in d.c. circuit containing inductor and resistor connected in series with e.m.f.
- ii) Draw the circuit for L-C-R series with alternating emf and derive an expression for impedance of circuit.
- iii) Draw circuit diagram of common emitter amplifier and explain its working.

B) Answer **any one** of the following : **10**

- i) Explain the construction and working of moving coil galvanometer and hence deduce the formula for quantity of charge flowing through it.
 - ii) Derive an expression for charge in charging and discharging of capacitor through resistance and hence define time constant.
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Seat No.	
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B.Sc. – I (Semester – II) (New CGPA Pattern) Examination, 2015
PHYSICAL GEOGRAPHY (Paper – II)
Geomorphology, Climatology

Day and Date : Monday, 27-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :**
- 1) **All questions are compulsory.**
 - 2) **Answers to the both Section should be written in separate answer book.**
 - 3) **Neat diagrams must be drawn wherever necessary.**
 - 4) **Use of map stencils is allowed.**
 - 5) **Figures to the right indicate full marks.**

SECTION – I

1. Complete the following sentences by choosing correct alternatives : 5
- 1) Climatology is a branch of _____
 - a) Human geography
 - b) Geology
 - c) Physical geography
 - d) Settlement geography
 - 2) The atmospheric pressure on both poles is generally _____
 - a) High
 - b) Moderate low
 - c) Moderate
 - d) Low
 - 3) _____ is the major source of heat to the earth surface.
 - a) Moon
 - b) Sun
 - c) Venus
 - d) Mars
 - 4) The atmospheric pressure at sea level is _____ Mb.
 - a) 1013.2
 - b) 1023.2
 - c) 1033.2
 - d) 1043.2
 - 5) Anti-Trade winds wear _____ south latitude are called as roaring forties.
 - a) 30°
 - b) 40°
 - c) 50°
 - d) 60°

P.T.O.



2. Answer **any five** questions of the following : **10**
- 1) Define oceanography.
 - 2) Name the oceans in the world.
 - 3) Give names of any two ocean currents.
 - 4) What is tide ?
 - 5) Types of coral reefs.
 - 6) Which ocean is present in North-Pole ?
 - 7) What is continental slope ?
3. A) Write short notes on **any two** of the following : **10**
- 1) Nature of oceanography.
 - 2) Salinity of ocean water.
 - 3) Continental shelf and slope.
- B) Answer **any one** of the following : **10**
- 1) Describe the ocean currents in Atlantic ocean with schematic diagram.
 - 2) Explain coral reefs and state its types with diagram.
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Seat No.	
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B.Sc. – I (Semester – II) (New) Examination, 2015
(C.G.P.A. Pattern)
STATISTICS (Paper – II)
Descriptive Statistics, Probability and Probability Distribution – II

Day and Date : Wednesday, 29-4-2015
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- N.B. :** 1) Figures to the **right** indicates **full** marks.
2) Answers to **two** Sections should be written in **separate** answer book.

SECTION – I
(Descriptive Statistics, Probability)

1. Choose the correct alternative :

5

- 1) The value of Cov (X, Y)
 - a) may be negative
 - b) is equal to Cov (Y, X)
 - c) is equal to zero when all Y's are constant
 - d) all of the above
- 2) Given that $r(X, Y) = 0.9$, then $r(2X + 1, Y + 3)$ is
 - a) 0.9
 - b) - 0.9
 - c) 1.9
 - d) - 1.9
- 3) The lines of regression intersect at the point
 - a) (0, 0)
 - b) (\bar{X}, \bar{Y})
 - c) (1, 1)
 - d) none of these
- 4) Ultimate class frequencies means the frequencies of the classes of
 - a) zero order
 - b) lowest order
 - c) highest order
 - d) none of these
- 5) The index number of base year is always taken as
 - a) 100
 - b) 0
 - c) 1
 - d) none of these



2. Answer **any five** of the following : 10
- i) Define positive correlation and negative correlation with suitable example.
 - ii) Define Spearman's rank correlation coefficient and state the limits of R.
 - iii) Explain two regression coefficients.
 - iv) State the expression for the acute angle between two regression lines and discuss the case when $r = \pm 1$.
 - v) State any two fundamental set of class frequencies, if the data contains three attributes A, B and C.
 - vi) What is attribute ? Define positive classes and negative classes.
 - vii) State important uses of index number.
3. A) Answer **any two** of the following : 10
- i) What is time reversal test of consistency ? Verify the same for Laspeyre's index number.
 - ii) Show that Correlation Coefficient (r) lies between -1 and $+1$.
 - iii) State the properties of regression coefficients and prove any two of them.
- B) Answer **any one** of the following : 10
- i) Derive the equation of line of regression of Y on X. by the method of least square.
 - ii) Obtain the relation between coefficient of association (Q) and coefficient of colligation (Y). Deduce that $|Q| \geq |Y|$.

SECTION – II
(Probability Distribution – II)

1. Choose the correct alternative : 5
- 1) Expectation of a constant is

a) 0	b) 1	c) constant	d) none of these
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 - 2) If (X, Y) is discrete r.v. with joint pmf $p(x, y) = \frac{k}{x+y}$

$x = 0, 1$
$y = 1, 2$

then the value of k is

a) $\frac{3}{7}$	b) $\frac{7}{3}$	c) 1	d) $\frac{2}{7}$
------------------	------------------	------	------------------



3) If $\text{Cov}(X, Y) = 3$ then covariance between $(3 - X)$ and $(5 - 3Y)$ is

- a) 11
- b) 9
- c) 6
- d) 0

4) If X has Binomial distribution with parameters n and p . If $E(X) = \frac{5}{3}$ and

$V(X) = \frac{10}{9}$ then p is

- a) $\frac{2}{3}$
- b) $\frac{1}{3}$
- c) $\frac{5}{6}$
- d) $\frac{1}{6}$

5) If X and Y are two independent random variables then

- a) $E(XY) = E(X) \cdot E(Y)$
- b) $\text{Corr}(X, Y) = 0$
- c) $P_{X+Y}(S) = P_X(s) \cdot P_Y(s)$
- d) All the above

2. Attempt **any five** :

10

- i) Define Mathematical expectation of the r.v.x.
- ii) Obtain the relation between 2^{nd} factorial moment and raw moments.
- iii) Show that when X and Y are independent, the conditional distribution of X given $Y = Y_j$ is the marginal distribution of X .
- iv) Prove that $\text{Cov}(X, X) = V(X)$.
- v) Obtain mean and variance of one point distribution.
- vi) State additive property of Bernoulli distribution.
- vii) Obtain recurrence relation of hypergeometric distribution.



3. A) Attempt **any two** :

10

i) Prove that :

a) $E(aX + b) = aE(X) + b$

b) $V(aX + b) = a^2V(X)$.

ii) Define uniform distribution and obtain its mean and variance.

iii) The joint pmf of (X, Y) is given as

X \ Y	-1	0	1
0	0.1	0.1	0.1
2	0.1	0.2	0.1
4	0.1	0.1	0.1

Show that (X, Y) are uncorrelated but not independent.

B) Attempt **any one** :

10

i) For the following joint probability distribution of X and Y :

X \ Y	1	2	3
1	$\frac{2}{15}$	$\frac{4}{15}$	$\frac{3}{15}$
2	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{4}{15}$

a) Obtain marginal distribution of X and Y .

b) Obtain $E(X)$, $V(X)$.

c) Obtain conditional distribution of X given $Y = 2$.

d) Obtain $E(X/Y = 2)$.

ii) Define binomial distribution obtain pgf of binomial distribution hence obtain its mean and variance. Show that mean is greater than variance.



SLR-R – 45

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B.Sc. (Part – I) (Semester – II) Examination, 2015
ZOOLOGY (Paper – II) (CGPA Pattern) (New)
(Animal Diversity – II and Ecology, Ethology, Evolution and Applied
Zoology)

Day and Date : Wednesday, 29-4-2015

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Draw **neat** labelled diagrams **wherever** necessary.
2) Figures to **right** indicate **full** marks.
3) **Two** Sections should be written in **separate** answer book.

SECTION – I
(Animal Diversity – II)

1. Rewrite the following sentences choosing alternative given below : 5
- 1) The heart of frog is _____ chambered.
a) 1 b) 3 c) 2 d) 4
 - 2) The fertilization in frog is
a) Internal b) External c) In uterus d) None of these
 - 3) The common openings for digestive, genital and excretory systems in frog is called as
a) Anus b) Cloaca c) Uterus d) Rectum
 - 4) Acetabulum is the cavity of
a) Urostyle b) Pelvic girdle c) Pectoral girdle d) Vertebrae
 - 5) The age of fish can be calculated by counting lines of growth in _____ scales.
a) Cycloid b) Ctenoid c) Ganoid d) Placoid

P.T.O.



2. Answer **any five** of the following : **10**
- i) Eggs of frog.
 - ii) Neotany.
 - iii) Paired fins in fish.
 - iv) Skin of frog.
 - v) Pancreatic juice of frog.
 - vi) First vertebra.
 - vii) Bile.
3. A) Write short notes on **any two** of the following : **10**
- i) Describe the ventricles of frog brain.
 - ii) Enlist the salient features of Urochordata.
 - iii) With a neat labelled diagram describe the dorsal and ventral views of heart of frog.
- B) Answer **any one** of the following : **10**
- i) Describe the gills in both cartilaginous and bony fishes.
 - ii) Describe the digestive system of frog and add a note on physiology of digestion.

SECTION – II

(Ecology, Ethology, Evolution and Applied Zoology)

1. Rewrite the following sentences choosing alternative given below : **5**
- 1) The network of food in a tropical level is called as
- | | |
|---------------|-------------|
| a) Food chain | b) Food net |
| c) Food web | d) Foodwell |
- 2) The behaviour of disguise the animals in a suitable background and protect from enemies is called
- | | |
|-------------|---------------|
| a) Mimicry | b) Camouflage |
| c) Modeling | d) Aggression |
- 3) The third walking leg of the worker bees are provided with
- | | |
|--------------------|-----------------------------|
| a) Pollen basket | b) Pollen comb |
| c) Sting apparatus | d) Spicks to collect pollen |



- 4) The study of behavioural characteristic is called
- a) Ecology
 - b) Ethology
 - c) Economics
 - d) Evolution
- 5) Overpopulation and overcrowding in the colonies of bees is avoided by _____ habit.
- a) Warming
 - b) Migration
 - c) Swarming
 - d) Group forming

2. Answer **any five** of the following : **10**

- i) Food Chain
- ii) Mimicry.
- iii) Biosphere.
- iv) Succession.
- v) Vestigial organs
- vi) Parasitism.
- vii) Ecology.

3. A) Write short notes on **any two** of the following : **10**

- i) Describe the path of energy flow in ecosystem.
- ii) Define an intraspecific relationships. Explain it with the reference to Symbiosis and Mutualism.
- iii) With a suitable example describe camouflage in animals.

B) Answer **any one** of the following : **10**

- i) Define Vermiculture. Describe the various techniques used in a vermiculture practice.
 - ii) Describe the both biotic and abiotic components of a pond ecosystem.
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Seat No.	
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B.Sc. I (Semester – II) (CGPA Pattern) (New) Examination, 2015
MATHEMATICS (Paper – II)
Geometry and Differential Equation

Day and Date : Saturday, 2-5-2015

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Answer to the two Section should be written in the separate answer book.**

SECTION – I
(Geometry)

1. Choose the correct alternative for **each** of the following.

5

1) The polar equation of $x^2 + y^2 - 4y = 0$ is

- a)
- $r = 4 \cos \theta$
- b)
- $r = 2 \cos \theta$
- c)
- $r = 2 \sin \theta$
- d)
- $r = 4 \sin \theta$

2) $\left(5, \frac{\pi}{6}\right)$ is the Polar co-ordinates of a point then its Cartesian co-ordinates is

- a)
- $\left(\frac{\sqrt{3}}{2}, \frac{5}{2}\right)$
- b)
- $\left(\frac{5\sqrt{3}}{2}, \frac{5}{2}\right)$
- c)
- $\left(\frac{\sqrt{5}}{2}, \frac{5}{2}\right)$
- d)
- $\left(\frac{3\sqrt{5}}{2}, \frac{5}{2}\right)$

3) The angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$ is

- a)
- $\frac{\pi}{2}$
- b)
- $\frac{\pi}{3}$
- c)
- $\frac{\pi}{4}$
- d)
- π

4) The distance of a point $(3, 4, 2)$ from the plane $6x - 2y + 3z + 7 = 0$ is

- a)
- $\frac{3}{7}$
- b)
- $\frac{13}{7}$
- c)
- $\frac{23}{7}$
- d)
- $\frac{33}{7}$

5) The centre and radius of the sphere $x^2 + y^2 + z^2 - 4x + 2y - 2z - 10 = 0$ is

- a)
- $(2, 1, 1), 4$
- b)
- $(2, -1, 1), 4$
-
- c)
- $(-2, 1, -1), 4$
- d)
- $(-2, 1, 1), 4$

P.T.O.



2. Attempt **any five** of the following. 10
- 1) Transform the equation $2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$ to parallel axes through the point $(-2, 3)$.
 - 2) Transform the equation $x^2 + 4xy + y^2 = a^2$ when the axes are rotated through an angle 45° .
 - 3) Identify the conic given by the equation $x^2 + 2xy + y^2 - 2x - 1 = 0$.
 - 4) Find the equation of the plane through the point $(2, 3, 4)$ and parallel to the plane $5x - 6y + 7z = 3$.
 - 5) Find the intercepts of the plane $2x - 3y + 4z = 12$ on the co-ordinate axes.
 - 6) Find the equation of the sphere whose diameter has extremities $(3, 4, -2)$ and $(-2, -1, 0)$.
 - 7) Find the equation of tangent plane to the sphere $x^2 + y^2 + z^2 = 49$ at the point $(6, -3, 2)$.
3. A) Attempt **any two** of the following. 10
- 1) Find an angle through which the rectangular axes are rotated so that $ax^2 + 2hxy + by^2$ transforms into $a'x'^2 + b'y'^2$.
 - 2) Prove that the equation of the plane whose normal from the origin has the direction cosines l, m, n and the length P is $lx + my + nz = P$.
 - 3) Obtain the equation of sphere whose diameter has the endpoints $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$.
- B) Attempt **any one** of the following. 10
- 1) If by rotation of axes, the expression $ax^2 + 2hxy + by^2$ becomes $a'x'^2 + 2h'x'y' + b'y'^2$ then $a + b$ and $ab - h^2$ are invariants.
 - 2) a) Find the equation of the plane passing through three points $A(3, 4, 2)$, $B(4, 6, 5)$ and $C(8, 2, 9)$.
b) Find the equation of the sphere through the circle $x^2 + y^2 + z^2 + 2x + 3y + 6 = 0$, $x - 2y + 4z - 9 = 0$ and the centre of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z + 5 = 0$.



SECTION – II
(Differential Equation)

1. Choose the correct alternative for **each** of the following. 5

1) The differential equation $Mdx + Ndy = 0$ is said to be exact if

- a) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ b) $\frac{\partial M}{\partial y} = -\frac{\partial N}{\partial x}$ c) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ d) $\frac{\partial M}{\partial x} = -\frac{\partial N}{\partial y}$

2) A differential equation is said to be linear if dependent variable and its derivatives appear only in the _____ degree.

- a) First b) Second c) Third d) Fourth

3) In the differential equation $Mdx + Ndy = 0$, if $\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N} = F(x)$ then integrating factor is

- a) $e^{\int F(x)dy}$ b) $e^{\int F(x)dx}$ c) $\int F(x)dx$ d) $e^{-\int F(y)dy}$

4) The particular integral of the differential equation $\frac{d^2y}{dx^2} - 4y = \sin 4x$ is

- a) $\frac{x}{20} \sin 4x$ b) $-\frac{\sin 4x}{20}$ c) $-\frac{x}{20} \cdot \cos 4x$ d) $-\frac{\cos 4x}{20}$

5) $\frac{1}{D-a}x =$

- a) $e^x \int e^{-x} x dx$ b) $e^{-x} \int e^x x dx$ c) $e^{ax} \int e^{-ax} x dx$ d) $e^{-ax} \int e^{ax} x dx$

2. Attempt **any five** of the following. 10

1) Solve $y\sqrt{1-x^2} dy + x\sqrt{1-y^2} dx = 0$.

2) Solve $(\sin x \cdot \cos y + e^{2x}) dx + (\cos x \cdot \sin y + \tan y) dy = 0$.

3) Solve $\frac{dy}{dx} + \frac{2xy}{x^2+1} = \frac{4x^2}{x^2+1}$.



4) Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3x}$.

5) Evaluate $\frac{1}{D+2} \cdot \sin x$.

6) Solve $\frac{d^4y}{dx^4} - 16y = 0$.

7) Solve $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$.

3. A) Attempt **any two** of the following.

10

1) State and prove the necessary and sufficient condition for the differential equation $Mdx + Ndy = 0$ to be an exact.

2) Solve $x^2ydx - (x^3 + y^3)dy = 0$.

3) Solve $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = x$.

B) Attempt **any one** of the following.

10

1) Explain the method of solving the differential equation of the form

$$\frac{dy}{dx} + PY = QY^n, \text{ where } P \text{ and } Q \text{ are functions of } x \text{ only hence solve}$$

$$(1 - x^2)\frac{dy}{dx} + xy = xy^2.$$

2) Prove that $\frac{1}{F(D^2)} \cdot \sin ax = \frac{1}{F(-a^2)} \cdot \sin ax$ where $F(-a^2) \neq 0$. Hence solve

$$\frac{d^3y}{dx^3} - y = \sin 2x.$$



Seat No.	
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B.Sc. – I (Semester – II) (New) Examination, 2015
BOTANY (Paper – II) (CGPA Pattern)
Gymnosperms and Angiosperm, Cell Biology, Genetics
and Plant Biotechnology

Day and Date : Saturday, 2-5-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N.B. :** 1) *All questions are **compulsory**.*
2) *Solve **each** Sections in **separate** answer books.*
3) ***Draw** neat and labelled diagrams **wherever** necessary.*
4) *Figures to the **right** indicate **full** marks.*

SECTION – I
(Gymnosperms and Angiosperms)

1. Rewrite the following sentences by choosing correct alternatives :

5

- 1) In cycas, Microsporangia are borne on the _____ surface.
a) adaxial b) abaxial c) marginal d) basal
- 2) Funnel shaped corolla is occur in _____ family.
a) Annonaceae b) Nyctaginaceae
c) Caesalpiniaceae d) Convolvulaceae
- 3) Ephedra belongs to the class _____
a) Cycadopsida b) Coniferopsida
c) Gnetopsida d) Both a) and b)
- 4) Aggregate fruit is developed from _____ gynoecium.
a) Apocarpous b) Syncarpous
c) Monocarpellary d) Both b) and c)
- 5) The name of the family is suffix _____
a) _ lae b) _ ales c) _ ceae d) _ rae



2. Answer **any five** of the following : **10**
- i) Give vegetative propagation in cycas.
 - ii) Comment on adhesion of stamens.
 - iii) Sketch and label the L.S. of ovule in cycas.
 - iv) Give economic values of gymnosperm (any two).
 - v) Give the function of accessory and necessary whorls of flower.
 - vi) Mention any four merits of Bentham and Hookers system.
 - vii) Give systematic position of family Caesalpiniaceae.
3. A) Write short notes on **any two** of the following : **10**
- i) T. S. of coralloid root of cycas.
 - ii) Write a note on composite or multiple fruits.
 - iii) Write the general characters of the family Annonaceae.
- B) Answer **any one** of the following : **10**
- i) Describe the structure of male cone and microsporophyll of cycas.
 - ii) Give the diagnostic feature and economic importance of any two following families :
 - a) Solanaceae
 - b) Nyctaginaceae
 - c) Caesalpiniaceae
 - d) Convolvulaceae.

SECTION – II

(Cell Biology, Genetics and Plant Biotechnology)

1. Rewrite the sentence by choosing correct alternatives : **5**
- 1) In mitosis, the chromosomes are arrange on equator in _____ stage.
 - a) Prophase
 - b) Metaphase
 - c) Telophase
 - d) Anaphase
 - 2) Oxidative phosphorylation takes place in _____
 - a) Golgi complex
 - b) Cytoplasm
 - c) Nucleus
 - d) Mitochondria



Seat No.	
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B.Sc. I (Semester – II) (New) Examination, 2015
ELECTRONICS (CGPA Pattern) (Paper – II)
Electronic Devices and Digital Electronics

Day and Date : Wednesday, 6-5-2015

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- N.B. :** 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat labelled** diagrams **wherever** necessary.
4) Use of log table and calculator is **allowed**.
5) **Two** Sections should be written in **two** separate answer books.

SECTION – I
(Electronic Devices)

1. Select correct alternative of the following : 5
- i) At 0K temperature, intrinsic semiconductor behaves as
a) an insulator b) a conductor
c) n-type semiconductor d) p-type semiconductor
- ii) A tunnel diode is
a) used with reverse bias
b) a slow switching device
c) a high resistivity PN junction diode
d) a very heavily doped PN junction
- iii) The β of a transistor is 99, then the value of α is
a) 9.9 b) 0.99 c) 99 d) 100
- iv) The current flowing through JFET is due to
a) majority carriers
b) minority carriers
c) recombination of electrons and holes
d) none of these
- v) An SCR is a semiconductor device which consists of
a) one PN junction b) two PN junctions
c) three PN junctions d) four PN junctions



2. Answer **any five** of the following : 10
- i) Name any two acceptor and any two donor impurity materials for doping of a semiconductor.
 - ii) Draw symbols of tunnel diode and photo diode with labels.
 - iii) Define h parameters for CE configuration of transistor.
 - iv) State characteristics of transistor in common collector configuration.
 - v) Draw symbols of Depletion and Enhancement MOSFET with labels.
 - vi) State any four applications of TRIAC.
 - vii) In a transistor circuit $I_E = 1 \text{ mA}$,
 $I_C = 0.94 \text{ mA}$. What is the value of I_B ?

3. A) Answer **any two** of the following : 10
- i) Describe the formation of PN junction.
 - ii) Explain working of tunnel diode with the help of I-V characteristics.
 - iii) Define α and β of a transistor. Deduce the relation between them.

- B) Answer any **one** of the following : 10
- i) Explain construction and characteristics of DIAC.
 - ii) Explain operation, V-I characteristics and transfer characteristics of N-channel depletion type MOSFET.

SECTION – II
(Digital Electronics)

1. Select correct alternative for the following : 5
- i) TTL has _____ input transistor.
a) Multi collector b) Multi base c) Multi emitter d) Normal
 - ii) Demultiplexer 8:1 requires _____ number of AND gates.
a) 2 b) 4 c) 6 d) 8
 - iii) RS flip-flop output remains same when
a) $R = S = 0$ b) $R = S = 1$ c) $R = 0, S = 1$ d) $R = 1, S = 0$
 - iv) SISO in shift register stands for
a) Shift In Shift Out b) Serial In Serial Out
c) Shift In Serial Out d) Serial In Shift Out
 - v) In Johnson counter _____ is connected back to input.
a) output b) complement of output
c) mode d) clock



2. Answer **any five** of the following : **10**

- i) Explain propagation delay in TTL.
- ii) Draw 4-bit SIPO shift register diagram.
- iii) Draw diagram of MSJK flipflop.
- iv) What is combination counter ?
- v) What is multiplexer ?
- vi) Draw timing diagram for right shift register with input 1000.
- vii) What is encoder ?

3. A) Answer **any two** of the following : **10**

- i) Explain TTL NAND gate.
- ii) Write a note on decade counter using IC 7490.
- iii) Draw diagram for priority encoder and give truth table.

B) Answer **any one** of the following : **10**

- i) Explain BCD to 7 segment decoder.
 - ii) Explain clocked RS flip-flop and edge triggered D-flip flop.
-



2. Answer the following (**any five**) : **10**
- 1) Define personality.
 - 2) How many types of memory ?
 - 3) Who use the term of mental age ?
 - 4) Who proposed the Hierarchy of need theory ?
 - 5) Give the formula of IQ.
 - 6) Define emotion.
3. Write the short note (**any two**) : **10**
- 1) Decay Theory
 - 2) James-Lange theory of emotion
 - 3) The three process of memory.
4. A) Explain the psychosexual stages of personality development. **10**
- OR
- B) Discuss on the Maslow's Hierarchy of need theory.

SECTION – II
(Human Development)

1. Fill in the blanks (Multiple choice) : **5**
- I) _____ found that menopause is the time of coalescence.
- | | |
|----------|------------|
| a) Brown | b) Sheedy |
| c) Myers | d) Lindzey |
- II) Instead of looking at adults development as a function of age _____ model views life events as markers of development.
- | | |
|-------------------------|--------------|
| a) The timing of events | b) Normative |
| c) Crisis | d) Both |
- III) _____ is more common now because society has changed in several ways.
- | | |
|-------------|--------------|
| a) Marriage | b) Divorce |
| c) Death | d) Any other |



IV) Teste sensitivity begins to decline at about as _____

- a) 70
- b) 60
- c) 50
- d) 20

V) The success of marriage in the late life may depend on the comple's ability to adjust to the personality changes of _____ age.

- a) Middle
- b) Old
- c) Young
- d) Adulthood

2. Answer **any five** of the following : **10**

- I) Write types of marriage.
- II) What is meant by Trait Theories ?
- III) What is mean by Monogamy ?
- IV) Give the names of five sences which change in late adulthood.
- V) What is approximate age of middle adulthood ?
- VI) Which therapy can be used to offer relief to women in relation to menopause problem ?

3. Write short notes (**any two**) : **10**

- I) The Female climate and menopause.
- II) Physical development in middle adulthood.
- III) Retirement in Late adulthood.

4. Answer **any one** of the following : **10**

A) Describe sensory and psychomotor changes in middle age.

OR

B) Explain the mid-carries crises of middle adulthood.



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B.Sc. – I (Semester – I) (C.G.P.A. Pattern) Examination, 2015
PHYSICAL GEOGRAPHY (Paper – I)
Geomorphology, Climatology

Day and Date : Monday, 13-4-2015

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Draw neat diagrams and maps wherever necessary.**
3) **Use of map stencils is allowed.**
4) **Figures to the right indicate full marks.**

SECTION – I

1. Choose the correct alternative :

5

- 1) Harold Jeffrey modified the original tidal hypothesis in the year
a) 1929 b) 1930 c) 1931 d) 1932
- 2) The evolution of surface features of the earth is studied in
a) Climatology b) Hydrology
c) Geomorphology d) Pedology
- 3) In 1905 Chamberlin and Moulten have suggested the _____ hypothesis.
a) Planetesimal b) Satellite
c) Tidal d) Gaseous
- 4) Sedimentary rocks are called as
a) Primary b) Secondary c) Tertiary d) Quarterly
- 5) The parallel and horizontal limbs of a recumbent fold are called as
a) Thrust b) Recumbent fold
c) Simple fold d) Nappes



2. Answer **any five** of the following : 10
- 1) Define the term of geomorphology.
 - 2) Describe the concept of SIMA.
 - 3) Describe the term of surface wave.
 - 4) What is metamorphism ?
 - 5) What is volcanoes ?
 - 6) What is folding ?
 - 7) What is faulting ?
3. A) Write short notes on **any two** of the following : 10
- 1) Classify the orogenic movement.
 - 2) State the types of folding.
 - 3) Nature and scope of geomorphology.
- B) Answer **any one** of the following : 10
- 1) Describe the chemical composition of the earth.
 - 2) Describe the type of volcanoes and its world distribution.

SECTION – II

1. Choose the correct alternative and rewrite : 5
- 1) Meandering streams are formed due to
 - a) River erosion
 - b) River deposition
 - c) River erosion and deposition
 - d) Wind erosion
 - 2) Soils are classified in major groups
 - a) 2
 - b) 4
 - c) 6
 - d) 8
 - 3) According to Davis landforms undergo sequential changes through
 - a) Process
 - b) Erosion
 - c) Weathering
 - d) Time
 - 4) _____ is the reaction of Carbonate ions with minerals.
 - a) Carbonation
 - b) Hydration
 - c) Oxidation
 - d) Solution
 - 5) The term weathering means
 - a) Decay
 - b) Erosion
 - c) Deposition
 - d) Transportation



2. Answer **any five** of the following : **10**
- 1) What is weathering ?
 - 2) Define the term of cycle of erosion.
 - 3) What is soil ?
 - 4) What is N.P.K. of soils ?
 - 5) What is oxidation ?
 - 6) What is headward erosion ?
 - 7) Describe the term of sand dunes.
3. A) Write short notes on **any two** of the following : **10**
- 1) River depositional landforms.
 - 2) State the type of erosion.
 - 3) State the types of physical weathering.
- B) Answer **any one** of the following : **10**
- 1) Define the term of soil and give the process of formation of soil.
 - 2) Describe the concept of cycle of erosion by W.M. Davis.
-



2. Answer **any five** of the following : 10
- i) Name the members of solar system.
 - ii) Rotation of earth.
 - iii) Define epicentre of earthquake.
 - iv) Define volcano.
 - v) Name the three major earthquake belt.
 - vi) Name the discontinuities in the earth with their location.
 - vii) Hypsographic curve.
3. A) Write short notes on **any two** of the following : 10
- i) Explain nebular hypothesis.
 - ii) Explain products of volcano.
 - iii) 2nd and 3rd order relief features.
- B) Answer **any one** of the following : 10
- i) Describe principal divisions of the earth
 - ii) Effects and causes of earthquake.

SECTION – II

Introduction to Physical Geology

1. Fill in the blanks with **correct** answer from the given options. 5
- 1) _____ are residual blocks of granitic rocks rising above the ground level.
a) Karren b) Tors c) Pits d) None of these
 - 2) A Basin which is bordered by mountains is known as _____.
a) Desert b) Bolson c) Bajadas d) Pediment
 - 3) Small rivers joining into a main stream is called _____.
a) Tributary b) Creek c) Mouth d) Brook
 - 4) The solid ice masses occupying depressions with steep back walls on mountain slopes at the highest altitudes are known as _____ glaciers.
a) Valley b) Cirque c) Piedmont d) Continental
 - 5) A _____ is developed at an angle to the shore or at the mouth of an embayment.
a) Spit b) Bar c) Hook d) Delta



2. Answer **any five** of the following :

10

- i) Regolith
- ii) Alluvial fans
- iii) Sea caves
- iv) Striations
- v) Mushroom rock
- vi) Pediments
- vii) Drumlins.

3. A) Write short notes on **any two** of the following :

10

- i) Explain Mechanical weathering.
- ii) Explain erosion by wind abrasion and attrition.
- iii) Explain depositional features of glaciers as Erratics and Morains.

B) Answer **any one** of the following :

10

- i) Explain stream processes of erosion, transportation and deposition.
 - ii) Explain depositional features developed by ocean.
-



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**B.Sc. I (Semester – II) Examination, 2015
(New) (CGPA Pattern)
MICROBIOLOGY (Paper – II)
Microbial Physiology and Applied Microbiology – I**

Day and Date : Wednesday, 6-5-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Answers to the two Sections should be written in separate answer book.**

SECTION – I

(Microbial Physiology)

1. Rewrite the following sentences by selecting correct alternative : 5
- i) _____ indicator is present in sugar fermentation medium.
a) Phenol red b) Methyl red c) Congored d) Andrade's
 - ii) Starch is substrate for _____ enzyme.
a) Cellulose b) Maltose c) amylase d) lipase
 - iii) _____ is the end product of EMP pathway.
a) Pyruvic acid b) Acetic acid c) Citricacid d) Lactic acid
 - iv) _____ component of culture media is useful in solidification.
a) agar agar b) Nacl c) Peptone d) Starch
 - v) _____ acts as a cofactor in enzyme action.
a) NAD b) riboflavin c) Fe⁺⁺ d) FAD
2. Answer **any five** of the following : 10
- i) Define Quaternary structure of protein.
 - ii) Explain Apoenzyme and coenzyme.

P.T.O.



- iii) Lithotrophs.
- iv) Define 'metabolism'.
- v) Give functions of carbohydrates.
- vi) Define 'log phase'.
- vii) Role of blood in culture media.

3. A) Write short notes on **any two** of the following : **10**

- i) Explain in brief Nutritional classification of bacteria.
- ii) Give an account of High energy compounds.
- iii) Types of enzymes.

B) Answer **any one** of the following : **10**

- i) What is Nutrition ? Explain role of starch, milk, peptone and bromo thymol blue in culture media.
- ii) Define growth. Give an account of growth phases of bacteria.

SECTION – II

(Applied Microbiology – I)

1. Rewrite the following sentences by selecting correct answer from the given alternatives. **5**

- i) _____ is the principle of sieve device used for air sampling.
a) Filtration b) precipitation c) impaction d) impingement
- ii) Presumptive test for bacteriological analysis of water is done by using _____ broth.
a) peptone b) Mac conkeys c) nutrient d) thioglycolate
- iii) _____ is a protein component of milk.
a) casein b) gelatin c) gluten d) globulin
- iv) _____ temperature is used for incubation for Eijkman's test.
a) 40°C b) 45.5°C c) 35°C d) 37°C
- v) A disease which is constantly present in a community is referred to as
a) epidemic b) endemic c) sporadic d) pandemic



2. Answer **any five** of the following : **10**
- i) Define droplet nuclei.
 - ii) Define coliforms.
 - iii) Write on sources of contamination of air.
 - iv) What is an acute infection ?
 - v) What is Eijkman's test ?
 - vi) What is an incubation period ?
 - vii) What is an epidemic ?
3. A) Write short notes on **any two** of the following : **10**
- i) Microbial examination of air by impaction method.
 - ii) Sources of contamination of water.
 - iii) Modes of transmission of diseases.
- B) Write **any one** of the following : **10**
- i) Describe qualitative bacteriological analysis of water.
 - ii) Give an account of composition of milk and sources of contamination of milk.
-



- 9) The _____ refused to admit him in the science stream.
 a) principle b) principal c) prince d) princess
- 10) Mother is a _____ singer than me.
 a) good b) better c) best d) worst

2. Answer **any five** of the following questions in **two** or **three** sentences **each** : **10**

- i) What does Dr. Kalam say about working for a mission ?
- ii) What did Von Braun advise Dr. A. P. J. Abdul Kalam ?
- iii) Where did Swami Vivekanand leave for and why ?
- iv) Describe the appearance of Swami Vivekananda.
- v) What does Nani Palkhivala say about freedom ?
- vi) How does Nani Palkhivala prove that man is the most dangerous animal ?

3. A) Answer **any two** of the following questions in **2** to **3** sentences **each** : **6**

- i) What is the central theme of the poem “Brahma” ?
- ii) How did different people approach the moon in the past ?
- iii) What does the end of the poem “Full Moon” suggest ?

B) Answer **any two** of the following questions briefly. **4**

- i) What is a notice ?
- ii) What are the aspects of a good CV ?
- iii) What is an e-mail ?

4. A) You are Anne Jacob, a graduate in chemical engineering from the NIT Warangal. You have three years experience as an assistant project engineer with a fertilizer company. Write an e-mail application letter in response to an advertisement for the post of project engineer in a well-known petrochemical company. Refer only briefly to your educational qualifications and work experience in the body of the letter and say that you are attaching your CV for the reference. **10**

OR

B) You are the Principal of the Arya College of Arts and Science, Solapur. Prepare an agenda for the meeting with the head of the English department and the secretary and treasurer of the College’s literary association. The meeting has been called to discuss the venue, date, and time of the programme.

5. Prepare a CV of your friend who is employed as a Professor. **10**



Seat No.	
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B.Sc. (Part – I) (Semester – II) (Old) Examination, 2015
CHEMISTRY
Organic Chemistry (Paper – III)

Day and Date : Thursday, 23-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All questions are compulsory.**
2) Draw **neat** diagram and give equations **wherever necessary.**
3) Figures to the **right** indicate **full marks.**

1. Choose the most correct alternative for **each** of the following : **10**
- 1) Corey-House reaction is useful for preparation of _____
 - a) Alkene
 - b) Diene
 - c) Alkane
 - d) Alkyne
 - 2) Cyclopentadiene cation is _____ compound.
 - a) Aromatic
 - b) Anti-aromatic
 - c) Pseudo aromatic
 - d) Non-aromatic
 - 3) Methane is a _____ molecule.
 - a) Planar
 - b) Linear
 - c) Tetrahedral
 - d) Trigonal
 - 4) Plane polarised light is used for analysis of _____
 - a) Geometrical isomers
 - b) Optical isomers
 - c) Conformational isomers
 - d) Cis isomers
 - 5) Carbanions are _____
 - a) Electron deficient
 - b) Electron rich
 - c) Neutral
 - d) None of these
 - 6) In the sulphonation of benzene, the electrophile is _____
 - a) HSO_3^-
 - b) SO_3
 - c) SO_2
 - d) H_2SO_4



3. A) Answer **any two** of the following : 6
- i) State with reason following compounds are optically active or not
 - a) 1 – bromo – 1 – pentene
 - b) 2 – methyl – 1 – butanoic acid
 - c) 2 – Chloro butane.
 - ii) Explain :
 - a) Bond dissociation energy
 - b) Average bond energy.
 - iii) Explain types of arrows with one example.
- B) How will you prepare cycloalkane by 4
- a) Internal wurtz reaction
 - b) Distillation of Ca or Ba salts of dicarboxylic acids.
4. Answer **any two** of the following : 10
- i) What will be the products when ethene reacts with
 - a) Per acid
 - b) H_2O/H^+
 - c) dil. $KMnO_4$ (oxidⁿ)
 - d) $O_3/Zn + H_2O$
 - e) H_2SO_4/H_2O .
 - ii) Explain reaction and mechanism involved in halogenation of benzene.
 - iii) What is dehydrohalogenation ? Explain formation of alkene with E^1 and E^2 mechanism.
5. Write notes on **any two** of the following : 10
- i) Resonance effect with respect to phenol
 - ii) Optical isomerism of 2, 3, – dihydroxy butanoic acid.
 - iii) Rearrangement reactions.
-



Seat No.	
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**B.Sc. – I (Semester – II) Examination, 2015
COMPUTER SCIENCE (Old)
Computer Fundamentals – II (Paper – III)**

Day and Date : Thursday, 23-4-2015

Total Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions:** 1) **All** questions are **compulsory**.
2) **Each** question carries **equal** marks.
3) Figures to the **right** place indicate **full** marks.

1. Choose **correct** alternatives :

10

- 1) To get the text onto the next line browser will use _____ tag.
a) <HR> b) <p> c)
 d)
- 2) By default how many worksheets appear in the Excel sheet tab
a) 2 b) 3 c) 4 d) 5
- 3) Which of the following group is belongs to the home tab ?
a) Font b) Alignment
c) Styles d) All of above
- 4) The small graphic or symbol that represents a program file, folder or device is
a) Icons b) Desktop
c) Monitor d) Pointer
- 5) IIS is designed for web servers that can be used by
a) Microsoft b) IBM
c) Apple d) Linux
- 6) Which of the following is use to manage basic system settings and controls ?
a) Windows explorer b) Accessories
c) Printer manager d) Control panel
- 7) Which tab would you select to displaying gridlines in the document ?
a) insert b) pagelayout
c) view d) review



- 8) A front end processor is usually used in
- a) multiprogramming
 - b) virtual storage
 - c) time sharing
 - d) multiprocessing
- 9) _____ is the process of transferring or receiving data from one point to other.
- a) Communication
 - b) Protocol
 - c) Topology
 - d) None of these
- 10) LAN is the interconnection of WAN and MAN
- a) True
 - b) False

2. Write the answer of the following questions (**any five**) : **10**

- I) Define the term networking.
- II) What is process ?
- III) Explain the use of link tag.
- IV) What is a word processor ?
- V) What is windows operating system ?
- VI) Define the term image map.

3. A) Write the answer of the following questions (**any two**) : **6**

- I) Write short note on “modem”.
- II) Explain unordered lists in HTML.
- III) Write note on CSS.

B) Explain briefly the contents of control panel and its need. **4**

4. Write answer of the following questions (**any two**) : **10**

- I) What is internet ? Explain the uses and benefits of internet.
- II) Write a note on functions in MS-Excel.
- III) What is table ? Explain <Table> tag in details.

5. Write the answer of following questions (**any two**) : **10**

- I) Explain the elements of windows operating system.
- II) Differentiate between multiprogramming and multiprocessing.
- III) What is javascript ? Explain advantages and disadvantages of javascript.



Seat No.	
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B.Sc. (Part – I) (Sem. – II) Examination, 2015
CHEMISTRY (Paper – IV) (Old)
Analytical Chemistry

Day and Date : Friday, 24-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions:** 1) **All questions are compulsory.**
2) Draw **neat** and labelled diagrams.
3) Figures to the **right** indicate **full** marks.
4) **Use of logarithmic tables and scientific calculator is allowed.**
(At. wt H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

1. Choose the most correct alternative and rewrite the sentence : 10

1) The property which depends on arrangement of atoms in the molecule is known as _____ property.

- a) Additive b) Constitutive
c) Colligative d) All of these

2) The formula $K = \frac{C_1}{\sqrt{C_2}}$ indicates that, the solute is present as a _____ molecule in second solvent.

- a) Single b) Double
c) Triple d) None of these

3) Viscosity of liquid is determined by

- a) Ostwald's viscometer b) Stalagmometer
c) Drop-pipette d) Conductometer

4) Liquids which are completely soluble with each other are called as _____ liquids.

- a) Immiscible b) Heterogeneous
c) Miscible d) Homogeneous



- 5) The easily fusible product formed due to the action of flux on gangue is called
- | | |
|-----------|--------------|
| a) Slag | b) Matrix |
| c) Gangue | d) Collector |
- 6) Carius method is used for estimation of
- | | |
|------------------------|------------------|
| a) Carbon and hydrogen | b) Nitrogen |
| c) Halogen | d) None of these |
- 7) In Lassaigne's test, Sulphur is converted to
- | | |
|---------------|---------------|
| a) CS_2 | b) Na_2S |
| c) Na_2SO_4 | d) Na_2SO_3 |
- 8) SO_x are
- | | |
|--------------------|----------------------|
| a) Soil pollutant | b) Air pollutant |
| c) Water pollutant | d) Nuclear pollutant |
- 9) The highest content of the protein in milk is
- | | |
|------------------|----------------|
| a) Casein | b) Lactalbumin |
| c) Lactoglobulin | d) Enzymes |
- 10) Reverse osmosis is used to purify _____ water.
- | | |
|-------------|-------------------|
| a) Fresh | b) Salty |
| c) Brackish | d) Both b) and c) |

2. Answer **any five** of the following :

10

- i) Define :
- Chemical Oxygen Demand (COD)
 - Biological Oxygen Demand (BOD)
- ii) What is Macleod's equation ? Give its modification by Sugden.
- iii) Distinguish between calcination and roasting (any two points).
- iv) Explain the principle of Lassaigne's test for the detection of elements.
- v) Name major nutrients of plants.
- vi) What is the function of U-tube and Potash bulb in Leibig combustion method ?



3. A) Answer **any two** of the following : 6
- i) Mention different types of ores. Give one example of each.
 - ii) Draw neat labelled diagram of Kjeldahl's method.
 - iii) Discuss health hazards of SO_2 .
- B) Benzoic acid was shaken between benzene and water. From the following concentrations of the acid in kg/dm^3 of aqueous and benzene layers. Show that acid exists in benzene as $(\text{C}_6\text{H}_5\text{COOH})_2$. 4
- | | | | |
|--|-------|-------|-------|
| Acid in H_2O layer | 0.015 | 0.019 | 0.030 |
| Acid in C_6H_6 layer | 0.242 | 0.42 | 0.970 |
4. Answer **any two** of the following : 10
- i) Describe a method of determination of coefficient of viscosity by Ostwald's viscometer.
 - ii) Write a short note on components of milk.
 - iii) 0.2475×10^{-3} kg of organic compound gave, on combustion, 0.4950×10^{-3} kg of carbon dioxide and 0.2025×10^{-3} kg of H_2O . Find the percentage of carbon and hydrogen.
5. Answer **any two** of the following : 10
- i) State the distribution law. What are its limitations ?
 - ii) State and explain "Surface tension". Give the S.I. unit of Surface Tension.
 - iii) Write a short note on types of water.
-



Seat No.	
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B.Sc. I (Semester – II) (Old) Examination, 2015
COMPUTER SCIENCE
Programming Using ‘C’ – II (Paper – IV)

Day and Date : Friday, 24-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

Instructions : 1) *All questions are compulsory.*
2) *Figures to the right place indicate full marks.*

1. Choose correct alternatives : 10
- 1) A local variable declared static retains its value even after the function is exited
a) True b) False
 - 2) How many values can be stored in a Union at a time ?
a) Only a single value b) Two values
c) No values d) Any number of values
 - 3) Which one of the following statement return the value stored at the memory address of a variable pointed by a pointer ptr ?
a) ptr b) value of (ptr)
c) * ptr d) & ptr
 - 4) Preprocessing is typically done
a) either before or at the beginning of the compilation process
b) after compilation but before execution
c) after loading
d) none of the above
 - 5) One pointer cannot hold address of another pointer
a) True b) False



- 6) When an existing file is open using 'w' mode, the contents of file are deleted
a) True b) False
- 7) By default, 'C' function return _____ type data.
a) char b) float c) int d) double
- 8) Pointers allow C to support dynamic memory management
a) True b) False
- 9) The default parameter passing mechanism is
a) call by value b) call by reference
c) call by value result d) none of these
- 10) _____ is used to read single integer value from file.
a) getchar() b) getc() c) getw() d) putw()

2. Attempt **any five** of the following :

10

- 1) Define structure.
- 2) What is function ?
- 3) Write syntax to use fopen() function.
- 4) Define pointer in 'C'.
- 5) What is recursion ?
- 6) Differentiate between text and binary modes.

3. A) Attempt **any two** of the following :

6

- 1) Explain call by value and call by pointer.
- 2) Explain array of structure.
- 3) Explain the differences between structure and union.

B) Write a program in 'C' to reverse the given number by using function.

4



4. Attempt **any two** of the following : **10**
- 1) Write a C language program to create file “even” to store all even numbers between 1 to N.
 - 2) Explain nested structure with example.
 - 3) Explain any two memory management functions used in ‘C’.
5. Attempt **any two** of the following : **10**
- 1) Explain various storage classes in ‘C’.
 - 2) Write a program using pointer to compute the sum of all elements stored in an array.
 - 3) Explain ‘fprintf()’ and ‘fscanf()’ file handling function in detail.
-



vi) The relation between coefficient of viscosity and coefficient of thermal conductivity is

a) $k = \eta C_v$ b) $\eta = k C_v$ c) $k = \frac{\eta}{C_v}$ d) $\eta = \frac{k}{C_v}$

vii) In heat engine if source temperature is 227°C and efficiency is 0.4 then its sink temperature is

a) 30°C b) 27°C c) 127°C d) 17°C

viii) The coefficient of thermal conductivity

a) increases with pressure b) decreases with pressure
c) independent of pressure d) (a) and (b)

ix) A commercial refrigerator operates between the temperatures -15°C and 27°C . The coefficient of performance is

a) 6.14 b) 61.4 c) 6.41 d) 64.1

x) The thermodynamic relation between pressure and volume is

a) $PV^{-r} = \text{constant}$ b) $PV^r = \text{constant}$
c) $PV^{1-r} = \text{constant}$ d) $PV^{r-1} = \text{constant}$

2. Answer **any five** of the following.

10

- i) What is the effect of temperature on viscosity of gas ?
- ii) Give any two properties of liquid helium.
- iii) State third law of thermodynamics.
- iv) Define heat engine.
- v) State the principle of air conditioning.
- vi) Calculate the diameter of nitrogen molecules at N.T. P. If the nitrogen molecule has $\lambda = 1.5 \times 10^{-8}$ cm and the number of molecules per C.C. is 3×10^{19} . (Use Clausius expression)

3. A) Answer **any two** of the following.

6

- i) Explain reversible and irreversible process.
- ii) Give the comparison between otto engine and diesel engine.
- iii) Calculate the work done when 'k' mole of a perfect gas expands isothermally at 27°C to double its original value ($R = 8.3 \text{ J/K} - \text{mole}^\circ\text{K}$)

B) Describe Linde's air liquefier.

4



4. Answer **any two** of the following. 10

- i) Define coefficient of viscosity of gas and obtain expression for it on the basis of transport phenomena.
- ii) Describe experimental setup to produce low temperature by adiabatic demagnetisation.
- iii) A Carnot's engine takes a thousand kilocalories of heat from a source at 627°C and rejects some of it to the sink at 27°C . Calculate work performed by Carnot's engine.

5. Answer **any one** of the following. 10

- i) Give the principle of refrigeration. Describe refrigeration cycle. Obtain an expression for coefficient of performance of refrigerator.
 - ii) Describe working of otto engine and obtain expression for its efficiency.
-



Seat No.	
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**B.Sc. (Part – I) (Sem. – II) Examination, 2015
PHYSICAL GEOGRAPHY (Paper – III) (Old)
Geomorphology**

Day and Date : Saturday, 25-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) Draw **neat** diagrams and maps **wherever** necessary.
3) Use of map stencils is **allowed**.
4) Figures to the right indicate **full** marks.

1. Choose the correct alternative. 10
- 1) Variation in _____ are mainly responsible for physical weathering.
(Mass, Velocity, Volume, Temperature)
 - 2) The concept of base level was put forward by
(Davis, Darwin, Penck, Powell)
 - 3) 'V' shaped valley is a landform due to _____ erosion.
(Glacier, River, Wind, Seawave)
 - 4) According to the cycle of erosion there are _____ changes in landforms through time.
(Abrupt, Random, Sudden, Sequential)
 - 5) _____ is a dead organic material in soil.
(Colour, Humus, Formation, Texture)
 - 6) A light soil consists mainly of
(Clay, Regolith, Sand, Silt)
 - 7) The soil is a stuff material in which _____ grow.
(Animal, Plant, Man, None of these)
 - 8) Soil _____ is the ability of soil to sustain plants.
(Fertility, Texture, Structure, Formation)



9) A lower _____ value indicates a greater degree of acidity.
(PH, HP, PQ, QH)

10) _____ of the soil refers to the size of the soil particles.
(Formation, Content, Structure, Texture)

2. Answer in short (**any five**) : **10**

- 1) Explain the term denudation.
- 2) What is erosion ?
- 3) Draw a neat diagram of waterfall.
- 4) Define the meaning of soil.
- 5) Soil colour
- 6) Importance of river in human life.

3. A) Answer in short (**any two**) : **6**

- 1) Describe the erosional work by wind.
- 2) Discuss various factors influencing the soil formation.
- 3) State the concept of cycle of erosion.

B) Discuss the causes of chemical weathering. **4**

4. Answer the questions (**any two**) : **10**

- 1) Write in detail the erosional landforms of a river.
- 2) Discuss the process of delta formation.
- 3) Explain the fertility of soil.

5. Answer the question (**any two**) : **10**

- 1) Explain the process of biotic weathering.
 - 2) Explain in detail elements of soil.
 - 3) Describe the various landforms produced by the work of wind.
-



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B.Sc. (Part – I) (Semester – II) Examination, 2015
PHYSICS (Paper – IV) (Old)
Electricity, Magnetism and Basic Electronics

Day and Date : Monday, 27-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N.B.:** 1) Draw a **neat** labelled diagrams **where** necessary.
2) The numbers to the **right** indicates **full** marks.
3) **Use** of calculators and log tables is **allowed**.
4) **All** questions are **compulsory**.

1. Choose the appropriate answer from the given alternatives : **10**
- 1) Time constant of the LR circuit is a time required to _____
- a) Grow the current 0.638 times the maximum current
 - b) Decay the current 0.362 times its maximum current
 - c) Grow the current up to 0.632 times of its maximum value or to decay the current up to 0.368 times is maximum value
 - d) Grow and decay of current exponentially in LR circuit
- 2) At resonance in the LCR series circuit _____
- a) Current flowing through is maximum
 - b) Impedance of the circuit is minimum
 - c) Inductive reactance and capacitive reactance are the same
 - d) $X_L = X_C$, $Z = R$ which is minimum, $I =$ maximum and the phase angle between flowing current and applied voltage is zero
- 3) In Zener diode
- a) Breakdown voltage is measured
 - b) Voltage is regulated
 - c) Dopping concentration is made high to minimise it's breakdown voltage
 - d) Depletion layer is very wide

P.T.O.



- 4) Moving coil Ballistic galvanometer is used _____
- a) To measure its deflection
 - b) To measure the steady current
 - c) To measure the charge
 - d) To measure its figure of merit
- 5) Time constant of CR circuit containing condenser of $10\ \mu\text{f}$ connected in series with the resistor of $2\text{M}\Omega$ is _____
- a) 20 ms
 - b) 5 sec
 - c) 0.5 sec
 - d) 20 sec
- 6) If current amplification factor of any transistor $\alpha = 0.99$ then its $\beta =$ _____
- a) 0.01
 - b) 0.09
 - c) 99
 - d) 100
- 7) Reciprocal of impedance is called as _____
- a) Reactance
 - b) Susceptance
 - c) Admittance
 - d) Resistance
- 8) Magnetic inductance produced along the axis of straight solenoid of infinite length is _____
- a) $\frac{\mu_0 n I}{2a}$
 - b) $\mu_0 n I$
 - c) $\mu_0 I$
 - d) $\mu_0 n I a$
- 9) Thickness of depletion layer in p-N junction diode is _____
- a) Equal to barrier potential
 - b) Directly proportional to the doping concentration
 - c) Inversely proportional to the doping concentration
 - d) Wide cluster of positive and negative charges
- 10) In transistor _____
- a) Emitter is lightly doped
 - b) Collector current is the sum of base and emitter currents
 - c) Emitter-base junction is always forwardly biased and base collector junction is always negatively biased
 - d) Base and collector layers are highly doped



2. Solve **any five** of the following : 10

- 1) What is damping in BG ? Give its two types.
- 2) Define the term figure of merit of B.G. Give its unit.
- 3) What is IC ? Identify its type of circuit component.
- 4) Define the term impedance. Give its unit.
- 5) Condenser of capacity $5\mu f$ is charged through resistor of resistance $1 m\Omega$. Calculate its time constant.
- 6) Write the relation between α and β both.

3. A) Solve **any two** of the following : 6

- 1) What is filter ? Which filter is superior ? Explain why ?
- 2) What is clipper ? Give its two types.
- 3) Calculate the series resonance frequency of a AC circuit containing $L = 10 mH$, $C = 10 nf$ and $R = 100\Omega$ in series.

B) Explain the characteristics of bijunction transistor in its common emitter configuration made. 4

4. Solve **any two** of the following : 10

- 1) Owen's bridge
- 2) Power factor of any AC circuit
- 3) Transistor as an amplifier in common emitter mode.

5. Solve **any one** of the following : 10

Explain in detail about charging and discharging of the condenser through resistor. Discuss its time constant.

OR

Derive an expression for magnetic induction at a point situated on the axis of current carrying solenoid of finite length. Extend the result for its infinity length.



2. Answer **any five** of the following : 10
- i) Explain qualitative type of data and quantitative type of data with an example.
 - ii) Define interval scale and ratio scale.
 - iii) State the requirement of good measures of central tendency.
 - iv) Define geometric mean and harmonic mean.
 - v) Define any two relative measures of dispersion.
 - vi) Define range and quartile deviation.
 - vii) State the first 4 central moments in terms of raw moment.
3. A) Write short notes on **any two** of the following : 10
- i) Explain the construction of histogram.
 - ii) Discuss the effect of change of origin and scale on arithmetic mean.
 - iii) For any frequency distribution, show that $\beta_2 \geq 1$.
- B) Answer **any one** of the following : 10
- i) Derive the formula for finding mode for a grouped frequency distribution.
 - ii) Define mean square deviation. State and prove the minimal property of mean square deviation.

SECTION – II

(Probability Distributions – I)

1. Choose the correct alternative : 5
- 1) 100 students are appearing for a entrance examination. The sample space of number of students passed is
- | | |
|----------|-----------------------|
| a) {100} | b) {1, 2, 3,.....100} |
| c) {0} | d) {0, 1, 2,.....100} |
- 2) Two events A and \bar{A} are
- | | |
|-------------------|-----------------------|
| a) Exhaustive | b) Mutually exclusive |
| c) Both a) and b) | d) Independent |



- 3) If $P(A) = 0.7$, $P(B) = 0.7$, $P\left(\frac{A}{B}\right) = 0.5$, then $P\left(\frac{B}{A}\right) =$
- a) 0.7 b) 1 c) 0.5 d) 0
- 4) Which of the following is a probability distribution ?
- a) (0.4, 0.4) b) (0.6, 0.4) c) (-0.4, 0.4) d) (0, 0.6)
- 5) If A and B are independent events with $P(A) = 0.4$, $P(B) = 0.5$ then $P(\bar{A} \cap B)$ is
- a) 0.03 b) 0.9 c) 0.1 d) 0.3

2. Answer **any five** of the following :

10

- i) Define
- a) simple event
b) Impossible event
- ii) A town has two doctors A and B operating independently. If the probability that doctor A is available 0.9 and that of B is available is 0.8. What is the probability that at least one doctor is available when needed ?
- iii) Write down the sample space and power set when a single coin is tossed.
- iv) If S is a sample space prove that $P\left(\frac{S}{A}\right) = 1$.
- v) Give two examples of mutually exclusive events.
- vi) Verify whether the following function can be looked upon as probability mass function of x.

$$P(x) = \frac{x+1}{10} \quad x = 0, 1, 2, 3$$

- vii) Define distribution function of r.v.X and state how median can be obtained from it.

3. A) Write short notes on **any two** of the following :

10

- i) For any events A and B prove that
- a) $P(\bar{A}/B) = 1 - P\left(\frac{A}{B}\right)$
b) $P(A/\bar{A}) = 0$
- ii) State and prove addition law of probability.
- iii) If A, B, C are any three events defined on Ω with $P(B) > 0$ then prove that $P(A \cup C/B) = P(A/B) + P(C/B) - P(A \cap C/B)$.



B) Answer **any one** of the following :

10

i) The probability distribution of r.v.X is given by

X	:	-3	-1	0	1	2	3	5	8
P(x)	:	0.1	0.2	0.15	0.2	0.1	0.15	0.05	0.05

Find :

- i) $P(-1 \leq X \leq 3)$
 - ii) Distribution function
 - iii) Median of x
 - iv) Distribution of $|X|$
 - v) $P[|X| > 2]$
- ii) Explain partition of sample space and state and prove Baye's theorem.
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B.Sc. (Part – I) (Semester – II) Examination, 2015
GEOGRAPHY (Old) (Paper – IV)
Physical Geography – Oceanography

Day and Date : Monday, 27-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- N.B. :** 1) **All questions are compulsory.**
2) **Use of map stencils is allowed.**
3) **Draw neat diagrams wherever necessary.**
4) **Figures to the right indicate full marks.**

1. Choose the correct alternative and rewrite. 10

- 1) Northern hemisphere is called as _____ hemisphere.
1) Water 2) Land 3) Ocean 4) Hydrogenic
- 2) _____ is the science which studies the oceans and seas.
1) Pedology 2) Geohydrology
3) Meteorology 4) Oceanography
- 3) Abyssal plains are also called as _____ plains.
1) shallow sea 2) deep sea 3) coral 4) till
- 4) The average temperature of surface water of the oceans is _____ degree centigrades.
1) 17.2 2) 19.4 3) 25.1 4) 26.7
- 5) _____ is the most significant salt present in the Ocean water.
1) NaCl 2) MgCl₂ 3) CaSO₄ 4) CaCO₃
- 6) The rise and fall in the level of sea water due to gravitational force is called as a
1) wave 2) current 3) tide 4) tidalbore
- 7) There are basically _____ types of ocean currents.
1) 2 2) 4 3) 6 4) 8



8) A cyclone is originated when _____ different air masses come in contact with each other.

- 1) 2 2) 4 3) 6 4) 8

9) The terrigenous materials deposited on the ocean floor include mainly

- 1) gravels 2) silicious oozes
3) red clay 4) diatom oozes

10) The coral reefs are formed by the accumulation of _____ of coral polyps.

- 1) bones 2) skulls 3) skins 4) skeletons

2. Answer **any five** questions of the following. **10**

- 1) What is a continental shelf ?
- 2) Give names of the Oceans.
- 3) What is a fringing reef ?
- 4) What is a 'Neap Tide' ?
- 5) Write down names of atleast two trenches.
- 6) Define the term 'ooze'.

3. A) Answer **any two** of the following. **6**

- 1) Describe the types of tides.
- 2) State the low salinity zones of the oceans.
- 3) Describe the types of ocean deposits.

B) Draw a neat diagram of "barrier reef". **4**

4. Give answers of **any two** questions. **10**

- 1) Mention the factors affecting temperature of ocean water.
- 2) Write in brief the importance of oceanography.
- 3) Describe the ocean currents of the North Atlantic Ocean.

5. Give answers of **any two** questions. **10**

- 1) State the formation of 'Spring Tide'.
 - 2) Describe the nature of oceanography.
 - 3) Write in brief the oozes on the ocean floor.
-



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B.Sc. – I (Semester – II) (Old) Examination, 2015
STATISTICS (Paper – III)
Descriptive Statistics – II

Day and Date : Tuesday, 28-4-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory and carry equal marks.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternatives :

10

- 1) The correlation between advertisement and sale of the product is
a) Positive b) Negative c) Zero d) None of these
- 2) Fisher's Index Number (I. N.) is _____ of Laspeyre's and Paasche's I. N.'s.
a) A. M. b) G. M. c) Maximum d) None of these
- 3) If X and Y are independent then the correlation coefficient between X and Y is
a) 0 b) -1 c) +1 d) None of these
- 4) The number of ultimate class frequencies for 'n' attributes is
a) 3^n b) 2^n c) 2^{n-1} d) None of these
- 5) Laspeyre's index formula uses the weights of the
a) Base year b) Current year
c) Average of a number of years d) None of these
- 6) Attributes A and B are independent if
a) $(AB) = (A)$ b) $(AB) = (B)$
c) $(AB) = (A)(B)$ d) $(AB) = \frac{(A)(B)}{N}$
- 7) The value of Cov (aX + b, cY + d) is equal to
a) ac Cov (X, Y) b) ab Cov (X, Y)
c) ad Cov (X, Y) d) None of these
- 8) The _____ of b_{yx} and b_{xy} is the correlation coefficient (r).
a) A. M. b) G. M. c) Cube root d) None of these



- 9) If the correlation coefficient (r) is ± 1 then the regression lines are
- Parallel
 - Perpendicular
 - Coincide
 - None of these
- 10) If one of the regression coefficient is greater then one then the other must be
- Less than one
 - Equal to one
 - Greater than one
 - None of these

2. Answer **any five** of the following : 10

- What do you mean by index number ? Discuss its importance.
- Define an attribute and order of a class with illustration.
- With usual notations, prove that $\frac{b_{xy} + b_{yx}}{2} \geq r$.
- Interpret the cases $r = -1, 0$ and 1 .
- Define Spearman's rank correlation coefficient.
- If the attributes A and B are independent then show that α and β are also independent.

3. A) Answer **any two** of the following : 6

- Show that the regression coefficients are independent of change of origin but not the scale.
- Define Laspeyre's, Paasche's and Fisher's price index numbers.
- Define the term association and disassociation with examples.

B) Show that the correlation coefficient (r) is independent of change of origin and scale. 4

4. Answer **any two** of the following : 10

- Show that Spearman's rank correlation coefficient lies between -1 and 1 .
- With usual notations, prove that $Q = \frac{2Y}{1+Y^2}$ and hence deduce that $|Q| \geq |Y|$.
- For consistent data, show that $(ABC) \geq (A) + (B) + (C) - 2N$.

5. Answer **any one** of the following : 10

- Explain the term regression. Derive an expression for the acute angle between the two regression lines and discuss the cases when $r = 0$ and $r = 1$.
- Explain different methods of construction of index numbers. State the time and factor reversal tests. Verify the same for Fisher's ideal index number.



- v) The correlation coefficient between X and Y is zero. We then conclude that
- X and Y have same distribution
 - The variances of X and Y are equal
 - There exists no relationship between X and Y
 - X and Y are independent
- vi) If X is a random variable with pgf $p(s)$ then $\mu'_1 = . . .$
- $(p'(s))_{s=1}$
 - $(p''(s))_{s=1}$
 - $(p'(s))_{s=0}$
 - $(p''(s))_{s=0}$
- vii) X and Y are independent r. v. then $\text{cov}(2X, 3Y)$ is
- 6
 - 2
 - 0
 - 3
- viii) A dice having same number '6' on all the faces is thrown, then the resultant distribution will be
- Uniform distribution
 - One point distribution
 - Binomial distribution
 - None of these
- ix) X has Binomial distribution with parameters 10 and 0.7 then its mean is
- 10
 - 0.7
 - 0.3
 - 7
- x) For hypergeometric distribution number of parameters are
- 1
 - 2
 - 3
 - 4

2. Attempt **any five** from the following :

10

- Define Mathematical expectation of a discrete r.v. X.
- Prove that the first central moment is always zero.
- For the following bivariate distribution obtain marginal distribution of X.
 $P(X = 0, Y = 0) = 0.4, P(X = 0, Y = 1) = 0.3.$
 $P(X = 1, Y = 0) = 0.2, P(X = 1, Y = 1) = 0.1.$
- Find mean of X whose pgf is $p_X(s) = \frac{1}{8} (1 + 3s + 3s^2 + s^3)$
- State and prove additive property of Bernoulli distribution.
- Give two real life situations where hypergeometric distribution is used.



3. A) Attempt **any two** from the following : 6

i) Obtain the effect of change of origin and scale on probability generating function (pgf).

ii) If X is a random variable having pmf $p(x) = \frac{1}{5} \quad x = 1, 2, 3, 4, 5$

Find E (2X+ 3)

iii) Obtain recurrence relation of probabilities for Binomial distribution.

B) State and prove Addition Theorem of Expectation. 4

4. Attempt **any two** from the following : 10

i) Prove that $V(a X + b) = a^2 v(X)$

ii) Define two point distribution and obtain its mean and variance.

iii) In a box there are two red pens, one black pen and one green pen. Two pens are drawn without replacement. X denotes number of red pens and Y denotes number of black pens. Write down the joint pmf of (X, Y) and obtain marginal distribution of X and Y.

5. Attempt **any one** from the following : 10

i) The joint probability distribution of X and Y is given below :

		Y	
		1	2
X	-1	2k	4k
	1	k	k

Find :

i) k

ii) $p(X + Y \leq 1)$

iii) $E(X/Y = 1)$

iv) Cov (X, Y)

ii) Define binomial distribution obtain its pgf and hence or otherwise obtain its mean and variance.



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B.Sc. (Part – I) (Semester – II) (Old) Examination, 2015
ZOOLOGY (Paper – IV)
Ecology, Ethology, Evolution and Applied Zoology

Day and Date : Wednesday, 29-4-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) *All questions are compulsory.*
2) *Figures to **right** indicate **full** marks.*
3) *Draw neat and labelled diagrams **wherever** necessary.*

1. Rewrite the sentence by selecting a appropriate answer. 10
- 1) The word ecology was first time used by
a) Haeckel b) Odum c) Taylor d) Vern burg
 - 2) Association between two different species in which both species are benefited is called
a) parasitism b) commensalism
c) mutualism d) parental care
 - 3) _____ is the principle and universal constituent of all living organisms.
a) Wind b) Water c) Humidity d) Rainfall
 - 4) Alluvial soil is formed by the transportation of the weather material by
a) Gravity b) Wind
c) Running water d) Glaciers
 - 5) In a food chain, grass-mouse-snake-hawk the tertiary consumer is _____
 - 6) Our earth along with the atmosphere that sustain life is called
a) Environment b) Biosphere c) Eco system d) climate
 - 7) The branch of biology which deals with the scientific observation of animal behavior is called as
a) Ethology b) Ecology c) Microbiology d) Zoology



Seat No.	
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B.Sc. – I (Semester – II) Examination, 2015
MATHEMATICS (Paper – III) (Old)
Geometry

Day and Date : Thursday, 30-4-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

N.B. : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Choose correct alternative for each of the following : **10**

1) The relation between old co-ordinates (x, y) and new co-ordinates (x', y') of a point P when the origin O is shifted to the point $O'(h, k)$ is given by

- a) $x' = x + h, y' = y + k$ b) $x = x' + h, y = y' + k$
c) $x = x' + h, y = y' - k$ d) $x = x' - h, y = y' + k$

2) Transformed equation of $2x^2 + y^2 - 4x + 4y = 0$ to parallel axes through $(1, -2)$ is _____

- a) $x'^2 + 2y'^2 = 6$ b) $2x'^2 + y'^2 = 6$
c) $x'^2 + y'^2 = 9$ d) none of these

3) The Cartesian equation of the circle $r = 2a \cos \theta$ is _____

- a) $x^2 + y^2 = a^2$ b) $x^2 + y^2 = 2ax$
c) $x^2 + y^2 = 2ay$ d) none of these

4) The equation of a plane passing through $(1, -3, 1)$ and parallel to $x + y + z = 3$ is _____

- a) $x + y + z = 1$ b) $x + y + z = 3$
c) $x + y + z = -1$ d) none of these

5) The angle between the planes $2x - y + 2z = 47$ and $4x + 3y + 12z = 17$ is _____

- a) $\cos^{-1}\left(\frac{12}{39}\right)$ b) $\cos^{-1}\left(\frac{39}{12}\right)$ c) $\cos^{-1}\left(\frac{39}{29}\right)$ d) $\cos^{-1}\left(\frac{29}{39}\right)$

P.T.O.



6) If OP is the diagonal of the cube with edges OX, OY, OZ then direction cosines of OP are _____

a) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

b) $\sqrt{2}, \sqrt{2}, \sqrt{2}$

c) $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

d) $\sqrt{3}, \sqrt{3}, \sqrt{3}$

7) The centre and radius of the sphere $x^2 + y^2 + z^2 - 4x - 6y + 8z + 4 = 0$ are _____

a) $(2, 3, -4); 5$

b) $(-2, -3, 4); 5$

c) $(-2, -3, -4); 5$

d) $(2, -3, 4); 5$

8) The equation of a sphere whose centre is at $(1, -3, 2)$ and which passes through the origin is _____

a) $x^2 + y^2 + z^2 - x + 3y + 2z + 4 = 0$

b) $x^2 + y^2 + z^2 - 2x + 6y - 4z = 0$

c) $x^2 + y^2 + z^2 - 2x + 6y - 4z = 6$

d) none of these

9) The intersection of a sphere and plane is _____

a) line

b) plane

c) circle

d) sphere

10) The distance of the point $P(3, 4, 2)$ from the plane $6x - 2y + 3z = -7$ is _____

a) $\frac{7}{23}$

b) $\frac{23}{7}$

c) 23

d) 7

2. Attempt **any five** from the following :

10

- 1) Find the equation of the sphere having the join of $A(-1, 2, 3)$ and $B(1, 3, -4)$ as its diameter.
- 2) Find the equation of a tangent plane to the sphere $x^2 + y^2 + z^2 - x + 2y + 3z = 8$ at the point $(1, 2, -3)$.
- 3) Find the equation of the plane passing through $(2, 1, 0)$ and parallel to the plane $2x + 3y + 4z = 27$.
- 4) Find the equation of the plane passing through $(2, 1, 1)$ and the line of intersection of planes $2x + 3y + 4z = 5$ and $3x - 2y + z + 1 = 0$.



- 5) Transform the equation $2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$ to parallel axes through the point $(-2, 3)$.
- 6) Transform the equation $4x^2 + 2\sqrt{3}xy + 2y^2 = 2a^2$ when the axes are rotated through an angle $\theta = 30^\circ$.

3. A) Attempt **any two** from the following : **6**

- 1) If by rotation of axes, the expression $\alpha x + \beta y$ changes to $\alpha'x' + \beta'y'$ then show that $\alpha^2 + \beta^2$ is an invariant.
- 2) Show that, the equation of the plane, in terms of its intercepts a, b, c which it makes on the axes is .

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$$

- 3) Find the radical plane of the spheres $x^2 + y^2 + z^2 - x + 2y - 5z + 12 = 0$ and $x^2 + y^2 + z^2 + 4x - y + 3z + 10 = 0$.

B) Show that the equation of the plane tangent to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at a point $P(x_1, y_1, z_1)$ is $xx_1 + yy_1 + zz_1 + u(x + x_1) + v(y + y_1) + w(z + z_1) + d = 0$. **4**

4. Attempt **any two** from the following : **10**

- 1) Define power of a point with respect to a sphere. Find the equation of a radical plane of two spheres.
- 2) Show that the direction ratios of a normal to the plane $Ax + By + Cz = D$ are A, B, C .
- 3) Find an angle through which the rectangular axes are rotated so that $ax^2 + 2hxy + by^2$ transforms into $a'x'^2 + b'y'^2$.

5. Attempt **any one** from the following : **10**

- 1) If by rotation of rectangular axes, the expression $ax^2 + 2hxy + by^2$ becomes $a'x'^2 + 2h'x'y' + b'y'^2$ then prove that $a + b = a' + b'$ and $ab - h^2 = a'b' - h'^2$.
 - 2) Find the centre and radius of the circle obtained by intersection of $x + 2y + 2z = 15$ and $x^2 + y^2 + z^2 - 2y - 4z = 11$.
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Seat No.	
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B.Sc. – I (Semester – II) Examination, 2015
BOTANY (Paper – III) (Old)
Gymnosperms and Angiosperms

Day and Date : Thursday, 30-4-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All** questions are **compulsory**.
2) Draw **neat** and labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by choosing correct alternatives : **10**
- 1) Carolloid roots are present in _____
a) Gnetum b) Pinus c) Cycas d) Cedrus
 - 2) _____ obtained from Abies balsamea.
a) Canada balsam b) Resin c) Gum d) Alcohol
 - 3) Archegonia are absent in female gametophyte of _____
a) Ginko b) Pinus c) Cycas d) Abies
 - 4) _____ generation is dominant in gymnosperms.
a) Sporophytic b) Gametophytic
c) Both a) and b) d) None of these
 - 5) _____ pollination is common in gymnosperms.
a) Insect b) Wind c) Animal d) Water
 - 6) _____ is post fertilization product.
a) Endosperm b) Synergid cells
c) Egg d) None of these
 - 7) _____ is an example of simple fruit.
a) Achene b) Etario of folicle
c) Etario of berries d) Etario of achenes
 - 8) In Bentham and Hooker's system, the class dicotyledons is divided into _____ subclasses.
a) One b) Two c) Three d) Four



- 9) The full form of ICBN is _____
- a) International Code of Botanical Nomenclature
 - b) International Code of Zoological Nomenclature
 - c) International Company of Botanical Nomenclature
 - d) None of these
- 10) Large petaloid bract is present in the family _____
- a) Annonaceae
 - b) Caesalpinaceae
 - c) Nyctaginaceae
 - d) Solanaceae

2. Answer **any five** of the following : **10**

- 1) What is actinomorphic flower ? Give one example.
- 2) Write any two merits of Bentham and Hooker's system of classification.
- 3) Write any two salient features of gymnosperms.
- 4) Write any two principles of ICBN.
- 5) Write any two economic importance of Solanaceae.
- 6) What is inflorescence ?

3. A) Answer **any two** of the following : **6**

- 1) Explain in brief the structure of microsporophyll of cycas with suitable diagram.
- 2) Give an account of economic importance of gymnosperms.
- 3) Write salient features of angiosperms.

B) Give an account of vegetative and floral characters of convolvulaceae with suitable diagram. **4**

4. Answer **any two** of the following : **10**

- 1) Explain in brief the structure of cycas ovule with suitable diagram.
- 2) What is floral diagram ? Draw floral diagram of caesalpinaceae.
- 3) What is fruit ? Give an account of composite fruits.

5. Answer **any one** of the following : **10**

- 1) Write salient features of Sporne's classification system of gymnosperms.
 - 2) Write an outline of Bentham and Hooker's system of classification.
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Seat No.	
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B.Sc. – I (Semester – II) (Old) Examination, 2015
MATHEMATICS (Paper – IV)
Differential Equation

Day and Date : Saturday, 2-5-2015

Total Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

Instructions: 1) **All questions are compulsory.**
2) Figures to the **right** indicate **full** marks.

1. Choose **correct** alternative for **each** of the following : **10**

1) The differential equation $(1 + x) dy + (1 - y) dx = 0$ is of the type

- a) Homogeneous
- b) Non homogeneous
- c) Variable separable
- d) None of these

2) The differential equation $Mdy + Ndx = 0$ is an exact if

- a) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$
- b) $\frac{\partial^2 M}{\partial y^2} = \frac{\partial^2 M}{\partial x^2}$
- c) $\frac{\partial N}{\partial y} = \frac{\partial M}{\partial x}$
- d) None of these

3) The integrating factor for the linear differential equation $\frac{dy}{dx} + Py = Q$ is

- a) $\int p dy$
- b) $\int p dx$
- c) $e^{\int p dx}$
- d) $e^{\int p dy}$

4) The differential equation $(x^4 - 2xy^2 + y^4) dx - (2x^2 - 4xy^3 + \sin y) dy = 0$ is

- a) Exact
- b) Linear
- c) Variable separable
- d) None of these



2. Attempt **any five** from the following :

10

1) Solve : $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$

2) Transform the differential equation

$\frac{dy}{dx} = \frac{x+2y-3}{2x+y-3}$ to homogeneous differential equation by proper substitution.

3) Show that

$(2xy + y - \tan y) dx + (x^2 - x \tan^2 y + \sec^2 y) dy = 0$ is an exact differential equation.

4) Solve : $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} = 0$

5) Solve : $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 4y = 0$

6) By using the formula find the value of $\frac{1}{D-1} \sin x$.

3. A) Attempt **any two** from the following :

6

1) Solve $(D^3 - D^2 - 6D) y = x^2 + \sin x$

2) Solve $\frac{dy}{dx} + \frac{2x}{x^2+1} y = \frac{4x^2}{x^2+1}$

3) Solve $(D^3 - 5D^2 + 8D - 4) y = e^{3x}$

B) Show that

4

$(D - \alpha)(D - \beta)y = (D - \beta)(D - \alpha)y$



4. Attempt **any two** from the following :

10

1) State and prove the necessary and sufficient condition for the equation $Mdx + Ndy = 0$ to be an exact.

2) Show how to solve $\frac{dy}{dx} + Py = Q$ where P and Q are functions of x.

3) Solve $(D^2 - 5D + 6)y = x + e^{2x} + \sin x$.

5. Attempt **any one** from the following :

10

1) With usual notation prove that, $\frac{1}{\phi(D^2)} \cos ax = \frac{1}{\phi(-a^2)} \cos ax$ if $\phi(-a^2) \neq 0$

and hence solve $\frac{d^2y}{dx^2} - 4y = 2 \sin\left(\frac{x}{2}\right)$.

2) a) What is meant by homogeneous differential equation ? Explain how to solve it.

b) Solve :

$$(x^3 + y^3) \frac{dy}{dx} = x^2y .$$



9) _____ pairs of contrasting characters in pea were studied by Mendel.
a) Seven b) Four c) Two d) Fourteen

10) The technique of obtaining large number of plant lets by tissue culture method is called _____
a) Embryo culture b) Micropropagation
c) Organ culture d) Macropropagation

2. Answer **any five** of the following : **10**

- i) Give the occurrence of mitochondria.
- ii) Enlist the functions of glyoxysomes.
- iii) Give the important chemical constituents of the cell wall.
- iv) What is 'back cross' ?
- v) Define "Biotechnology".
- vi) Give about the necessity of biofertilizers.

3. A) Answer **any two** of the following : **6**

- i) Define prokaryotic and eukaryotic cell.
- ii) Give the structure of peroxisomes.
- iii) Why Mendel selected pea plant for his experiment ?

B) Explain 'Law of Dominance' with suitable example. **4**

4. Answer **any two** of the following : **10**

- i) Explain in brief the various stages of Mitosis.
- ii) Describe the 'Monohybrid Cross' with suitable example.
- iii) Give the scope of Biotechnology.

5. Answer **any one** of the following : **10**

- i) Describe Singer-Nicholson's fluid-mosaic model of cell membrane.
 - ii) Give an account of general techniques of tissue culture.
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Seat No.	
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**B.Sc. I (Semester – II) Examination, 2015
ELECTRONICS (Paper – III) (Old)
Electronic Devices**

Day and Date : Tuesday, 5-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of log table and calculator is allowed.**
4) **Draw neat and labelled diagram wherever necessary.**

1. Select correct alternative for the following : 10

- i) The intrinsic semiconductor acts as perfect insulator at _____ temperature.
a) 0° C b) 0° K c) 273° F d) 270° C
- ii) Donor impurities creates
a) Free electrons
b) Free-holes
c) Both free electrons and holes
d) None of these
- iii) The LED emits the light due to
a) momentum of holes b) emission of electrons
c) electron-hole recombinations d) none of these
- iv) A zener diode is formed by _____ impurity.
a) Lightly doped b) heavily doped
c) pure semiconductor d) none of these
- v) The properly biased JFET acts as
a) Voltage controlled device b) Current controlled device
c) Current source device d) Voltage source device



4. Answer **any two** of the following : 10

- i) Explain the construction and working of SCR.
- ii) Draw the circuit diagram to obtain the output characteristics of transistor in CE configuration. Hence determine β .
- iii) Explain the zener and Avalanche breakdown of zener diode.

5. Answer **any one** of the following : 10

- i) Explain construction and working of an UJT.
 - ii) Explain construction, working and drain characteristics of depletion type MOSFET.
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Seat No.	
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**B.Sc. (Part – I) (Semester – I) Examination, 2015
ZOOLOGY (Paper – I) (CGPA Pattern)
Animal Diversity and Cell Biology and Genetics**

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :** 1) Draw **neat** labelled diagram **wherever** necessary.
2) Figures to the **right** indicate **full** marks.
3) **Two** Sections should be written in **separate** answer book.

**SECTION – I
(Animal Diversity)**

1. Rewrite the following sentences choosing correct alternative given below : **5**
- 1) Ascaris belongs to phylum _____
 - a) Nematelminthes
 - b) Porifera
 - c) Coelenterata
 - d) Protista
 - 2) _____ contractile vacuoles are present in Paramecium.
 - a) One
 - b) Two
 - c) Three
 - d) Four
 - 3) Spicules of sycon are secreted by _____
 - a) Porocytes
 - b) Pinacocytes
 - c) Scleroblasts
 - d) Coenocytes
 - 4) Tapeworm is an _____ parasite.
 - a) Obligatory
 - b) Ecto and endo
 - c) Ecto
 - d) Endo
 - 5) In earthworm setae are organs for _____
 - a) Reproduction
 - b) Locomotion
 - c) Excretion
 - d) Circulation



2. Answer **any five** of the following : 10
- i) Salient features of Platyhelminthes.
 - ii) Interstitial cells of Hydra.
 - iii) Gizzard of earthworm.
 - iv) Meganucleus of paramecium.
 - v) Functions of spicules in sycon.
 - vi) Looping in Hydra.
 - vii) Scolex of Tapeworm.
3. A) Write short notes on **any two** of the following : 10
- i) Give morphological adaptations in Tapeworm.
 - ii) Describe contractile vacuole in Paramecium.
 - iii) Describe the female reproductive system of earthworm.
- B) Answer **any one** of the following : 10
- i) Describe nutrition in Hydra.
 - ii) Give an account of different types of cells found in Sycon.

SECTION – II
(Cell Biology and Genetics)

1. Rewrite the following sentences choosing correct alternative given below : 5
- 1) The nucleus was firstly discovered by _____
- | | |
|-----------------|----------------|
| a) Robert Brown | b) De Duve |
| c) De Robertes | d) Robert Hook |
- 2) Suicidal bags of cells are _____
- | | |
|----------------|-----------------|
| a) Chromosomes | b) Ribosomes |
| c) Lysosomes | d) Mitochondria |
- 3) In Mendelian dihybrid cross, phenotypic ratio is _____
- | | |
|------------------|--------------|
| a) 3 : 1 | b) 1 : 2 : 1 |
| c) 9 : 3 : 3 : 1 | d) 8 : 8 |



4) The person with blood group _____ is called universal donar.

- a) A b) B c) AB d) O

5) PKU person is having abnormal metabolism of _____

- a) Valine b) Phenyl alanine
c) Lysine d) Arginine

2. Answer **any five** of the following : **10**

- i) Give principals of Electron microscopy.
- ii) Functions of Golgi complex.
- iii) Describe Rh-Factor.
- iv) Describe the law of dominance.
- v) Give the functions of lysosomes.
- vi) XY method of sex determination.
- vii) Structure of lamp brush chromosome.

3. A) Write short notes on **any two** of the following : **10**

- i) Describe the electron microscopic structure of mitochondria.
- ii) Describe human genetic disorder sickle cell anemia.
- iii) Describe the fluid mosaic model of plasma membrane.

B) Answer **any one** of the following : **10**

- i) Explain the law of independent assortment with suitable example.
 - ii) Describe the ultrastructure of Endoplasmic reticulum. Give its functions.
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Seat No.	
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B.Sc. – I (Old) (Semester – II) Examination, 2015
GEOLOGY (Paper – III)
Introduction to General Geology

Day and Date : Tuesday, 5-5-2015
Time : 3.00 p.m.to 5.00 p.m.

Max. Marks : 50

- N.B. :** 1) **All the questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

1. Fill in the blanks with correct answer from the given options : **10**
- 1) Gutenberg discontinuity is at a depth of _____
a) 3000 km b) 3100 km c) 2900 km d) 7000 km
 - 2) The Big-Bang theory explains the origin of _____
a) earth b) moon c) universe d) satellite
 - 3) The point of earthquake within the earth is known as _____
a) Epicentre b) Focus
c) Isoseismal line d) Isohyet
 - 4) The ancient single super continent is known as _____
a) Gondwana b) Asia c) Pangea d) African
 - 5) Approximate distance of the planets from the sun follows the _____
a) Kepler's law b) Newton's law
c) Titus-Bode's law d) Poisson's law
 - 6) Average density of the earth is _____
a) 5.2 b) 5.5 c) 5.1 d) 4.9
 - 7) Revolution period of earth around the sun is _____
a) 365.25 b) 365 c) 365.50 d) 365.75
 - 8) The volcano, which is not active today but have been known to be active in geological past, is termed as _____ volcano.
a) active b) dormant c) extinct d) none of these



9) The opening through which sulphurous gases comes out is known as

- a) fumaroles b) solfataras c) gysers d) hot spring

10) _____ includes in the principle division of the earth.

- a) Atmosphere b) Hydrosphere c) Lithosphere d) All of these

2. Answer **any five** of the following : **10**

- 1) Members of solar system
- 2) Equinox
- 3) Size of earth
- 4) Definition of earthquake
- 5) Definition of volcano
- 6) Biosphere.

3. A) Answer **any two** of the following : **6**

- 1) Interdisciplinary nature of Geology
- 2) Hypsographic curve
- 3) Seismic waves.

B) Write note on : **4**

Volcanic belt.

4. Answer **any two** of the following : **10**

- i) Describe Nebular hypothesis.
- ii) Describe relief features of earth.
- iii) Explain classification of volcano based on mode of eruption.

5. Answer **any two** of the following : **10**

- i) Describe effects of earthquake.
 - ii) Describe internal structure of earth.
 - iii) Describe causes of volcano.
-



Seat No.	
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**B.Sc. I (Semester – II) (Old) Examination, 2015
MICROBIOLOGY
Microbial Physiology (Paper – III)**

Day and Date : Tuesday, 5-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

1. Rewrite the following sentences by selecting correct answer from given alternatives :

10

i) _____ is an example of disaccharide.

- a) Monosaccharide b) Disaccharide
c) Trisaccharide d) Polysaccharide

ii) _____ phase is youthful phase of bacterial growth.

- a) Lag b) Logarithmic c) Stationary d) Death

iii) _____ is used as a pH indicator in MacConkey's agar.

- a) Bromothymol blue b) Neutral red
c) Phenol red d) Andrade's indicator

iv) Rumen bacteria are _____ in nature.

- a) Aerobic b) Anaerobic
c) Facultative aerobes d) None of these

v) _____ is an example of extracellular enzyme.

- a) Amylase b) Synthetase
c) DNA ligase d) Polymerase

P.T.O.



vi) β -galactosidase is synthesized only when _____ is present in the medium.

- a) Glucose
- b) Galactose
- c) Gluconic acid
- d) Lactose

vii) _____ is a solidifying agent.

- a) Peptone
- b) Agar
- c) NaCl
- d) Meat extract

viii) _____ is an example of quaternary protein.

- a) Casein
- b) Haemoglobin
- c) Gelatin
- d) Albumin

ix) _____ is normal flora of human skin.

- a) Bacillus antracis
- b) Escherichia coli
- c) Staphylococcus aureus
- d) Salmonella typhi

x) _____ enzyme involved in nitrogen fixation.

- a) Nitrogen reductase
- b) Nitrogenase
- c) Nitrase
- d) Nitrogen oxidase

2. Answer **any five** of the following :

10

- i) Define metabolism.
- ii) Role of peptone in the medium.
- iii) Lag phase.
- iv) ATP.
- v) Intracellular enzymes.
- vi) Cofactors.



3. A) Answer **any two** of the following : **6**
- i) Proteins.
 - ii) Basic structure of enzyme.
 - iii) Autotrophs.
- B) Normal flora of human body and their significance. **4**
4. Answer **any two** of the following : **10**
- i) Nutritional requirements of microorganisms.
 - ii) Nucleic acids.
 - iii) EMP.
5. Answer **any two** of the following : **10**
- i) Ruminant symbiosis.
 - ii) Common components of media and their functions.
 - iii) Describe growth phases of bacteria.
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Seat No.	
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B.Sc. – I (Semester – II) (Old) Examination, 2015
ELECTRONICS (Paper – IV)
Digital Electronics

Day and Date : Wednesday, 6-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Neat diagram must be drawn whenever necessary.**

1. Select the correct alternative from the following : 10
- i) TTL stands for
 - a) Transistor Transformer Logic b) Transistor Transistor Logic
 - c) Transformer Transformer Logic d) Transreceiver Transistor Logic
 - ii) Maximum value of sinking current is
 - a) 1 MA b) 1.6 MA c) 16 MA d) 40 MA
 - iii) _____ is priority encoder IC.
 - a) 7447 b) 74147 c) 7490 d) 7495
 - iv) The number of control lines used in 8 : 1 multiplexer are
 - a) Five b) Six c) Eight d) Three
 - v) In case of R-S flip-flop using NOR, the output is in forbidden state when
 - a) $R = 0, S = 0$ b) $R = 0, S = 1$ c) $R = 1, S = 1$ d) $R = 1, S = 0$
 - vi) J-K flip-flop operates in toggle mode when
 - a) $J = K = 1$ b) $J = K = 0$ c) $J = 1, K = 0$ d) $J = 0, K = 1$
 - vii) The decade counter IC is
 - a) 7447 b) 7490 c) 74147 d) 74153
 - viii) Maximum counts using three bit counter is
 - a) 3 b) 6 c) 8 d) 9



- ix) SISO stands for
- a) Serial Input Standard Output b) Standard Input Serial Output
 - c) Standard Input Standard Output d) Serial Input Serial Output
- x) _____ can be constructed using shift register IC 7495.
- a) Ring counter b) Johnson counter
 - c) Decade counter d) Both a) and b)

2. Attempt **any five** of the following : **10**
- i) Define the term : a) Fan out b) Noise margin.
 - ii) Draw the diagram of 2 : 4 decoder.
 - iii) Draw the logic diagram of RS flip-flop using NOR gate.
 - iv) Name the different types of shift registers.
 - v) What is combinational counter ?
 - vi) What is priority encoder ?
3. A) Answer **any two** of the following : **6**
- i) Draw the diagram of TTL NAND gate.
 - ii) Differentiate between multiplexer and demultiplexer.
 - iii) Explain T flip-flop.
- B) Draw the timing diagram of decade counter. **4**
4. Attempt **any two** of the following : **10**
- i) Explain 1 : 4 demultiplexer.
 - ii) Explain 4 bit SIPO shift register.
 - iii) Explain D flip-flop with timing diagram.
5. Answer **any one** of the following : **10**
- i) Explain BCD to 7 segment decoder.
 - ii) Explain shift register IC 7495 as
 - a) Right shift register
 - b) Ring counter.
-



Seat No.	
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B.Sc. I (Semester – II) (Old) Examination, 2015
MICROBIOLOGY (Paper – IV)
Applied Microbiology – I

Day and Date : Wednesday, 6-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

N.B. : 1) All questions are compulsory.
2) Figures to the right indicate full marks.

1. Rewrite the following sentences by selecting correct answers from given alternatives.

10

- 1) Bead bubbler device is used for Microbiological examination of
a) Water b) Soil c) Milk d) Air
- 2) _____ is used as an indicator of fecal pollution of water.
a) E. coli b) S. Aureus c) Bacillus d) Azotobacter
- 3) Microbiological quality of Milk is determined by _____ test.
a) MPN b) SPC c) MBRT d) Phosphatase
- 4) Degree of pathogenicity is called
a) Infection b) Disease c) Recovery d) Virulence
- 5) _____ is an example of non-perishable food.
a) Potato b) Meat c) Fruits d) Sugar
- 6) _____ is main protein present in milk.
a) Casein b) Albumin c) Glutemin d) Gelatin
- 7) Kovac's reagent is used for detection of _____ in IMViC test.
a) Acid b) Indole c) Acetoin d) Citrate
- 8) Organic matter is abundant in _____ layer of soil.
a) Middle b) Upper c) Deeper d) All of these

P.T.O.



- 9) Sand filters are used for _____ purification.
a) Air b) Milk c) Water d) Soil
- 10) EMB agar is used for _____ test of water.
a) Presumptive b) Completed c) Confirmed d) Final

2. Answer in short **any five** of the following. **10**
- i) Define food poisoning.
 - ii) What is infectious dust ?
 - iii) Define fecal pollution of water.
 - iv) What is mortality rate ?
 - v) Define pathogenicity.
 - vi) Give the examples of perishable foods.
3. A) Answer **any two** of the following. **6**
- i) Chemical composition of soil.
 - ii) Sources of microorganisms in air.
 - iii) Types of diseases.
- B) Describe MBRT test. **4**
4. Answer **any two** of the following. **10**
- 1) Describe various sources of contamination of milk.
 - 2) Describe modes of disease transmission.
 - 3) Give the microbial composition of soil.
5. Answer **any one** of the following. **10**
- 1) Describe in detail Bacteriological analysis of water.
 - 2) Describe in detail principles and methods of food preservation.
-



Seat No.	
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B.Sc. (Part – II) (Semester – III) (New) Examination, 2015
CHEMISTRY (Paper – V)
Organic Chemistry

Day and Date : Tuesday, 19-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) Figures to the **right** indicate **full marks.**
3) **Use of log table or calculator is allowed.**
4) Atomic weight : H = 1, C = 12, N = 14, O = 16 Cl = 35.5, I = 127, Ag = 108.
5) Spectroscopic chart is **supplied.**

1. Choose the correct alternative for **each** of the following : **10**

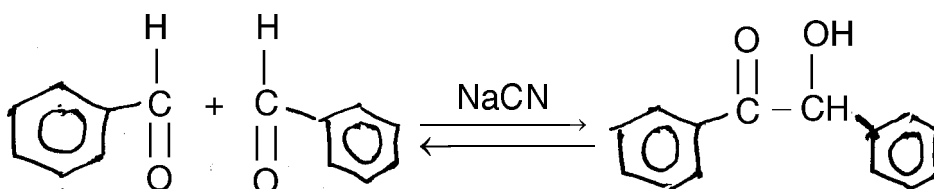
i) Configuration of ketoximes are determined by _____ reaction.

- a) Perkins reaction b) Hofmann's reaction
c) Beckman reaction d) Cannizzaro reaction

ii) Migration of acyl group of phenyl ester takes place in _____

- a) Fries rearrangement
b) Claisen rearrangement
c) Pinacol-pinacolone rearrangement
d) Gattermans reaction

iii) Name the following reaction _____



- a) Aldol condensation b) Benzoin condensation
c) Perkins condensation d) Knoevenagel's condensation

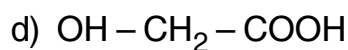
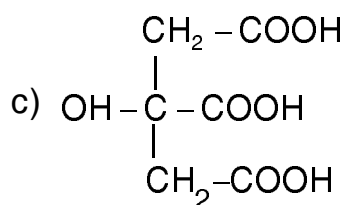
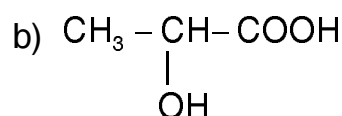
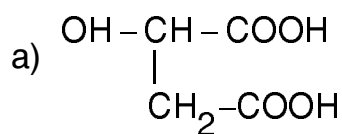
iv) Methyl orange has _____ colour in acid medium.

- a) Yellow b) Blue c) Black d) Red

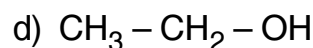
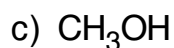
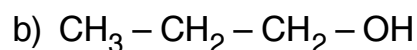
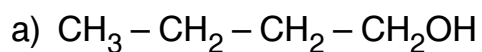
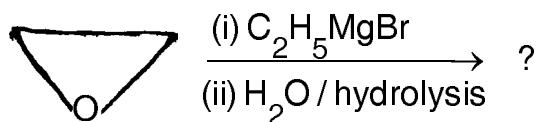
P.T.O.



v) Among the following which is citric acid.



vi) What is the product of following reaction ?



vii) Glycerol on oxidation with bismuth nitrate gives _____

a) Oxalic acid

b) Glyceric acid

c) Mesoxalic acid

d) Tartaric acid

viii) U.V. spectroscopy is mainly used for the determination of _____

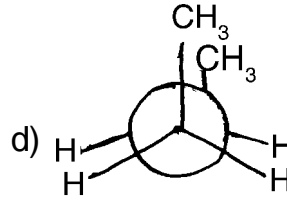
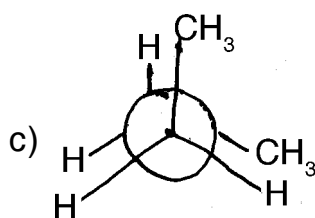
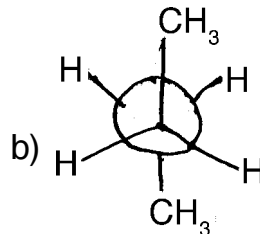
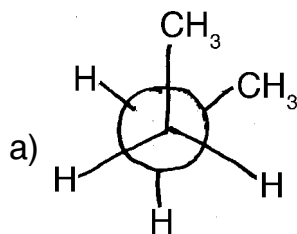
a) Functional group

b) Conjugation

c) Molecular weight

d) Empirical formula

ix) Among the following which is staggered conformation of ethane.





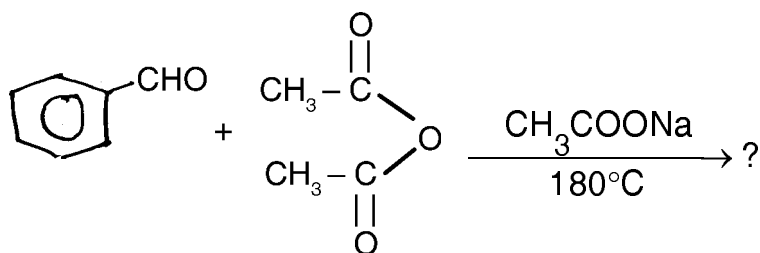
x) Which type of electronic transition required least energy ?

- a) $\pi \rightarrow \pi^*$ b) $n - \pi^*$
c) $\sigma \rightarrow \sigma^*$ d) $n \rightarrow \sigma^*$

2. Answer **any five** of the following :

10

- How will you convert benzene diazonium chloride into benzene and phenyl hydrazine ?
- Draw the potential energy diagram of different conformations of n-butane.
- Give any one method of preparation and uses of ethylene glycol.
- Explain why trans cinnamic acid absorb at longer wavelength than cis cinnamic acid ?
- Complete the following reaction and name it.

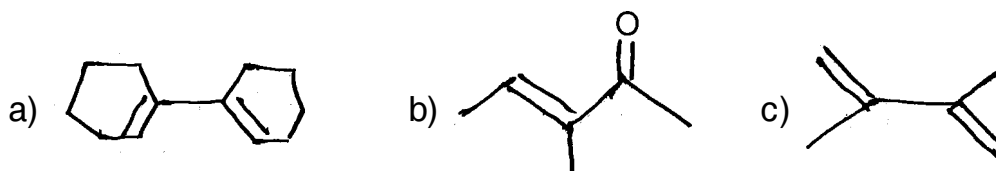


vi) Give synthesis of methyl orange.

3. A) Answer **any two** of the following :

6

- How Beckmann transformation is used to assign the configuration of ketoximes ?
- Give any two methods of preparations of cinnamic acid.
- Calculate the $\lambda - \text{max}$ of following dienes and enones.



B) When 1.38×10^{-5} kg of methoxy compound having molecular formula $\text{C}_7\text{H}_{22}\text{O}_2$ is subjected to zeisel's method and produces 4.7×10^{-5} kg of AgI. Calculate the percentage and number of methoxy groups present in the compound.

4



4. Answer **any two** of the following :

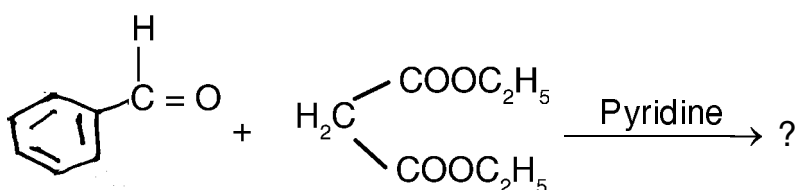
10

- What is pinacol ? Discuss pinacol-pinacolone rearrangement reaction.
- Draw the different conformations of n-butane by using saw-horse and dotted line wedge formula.
- Discuss the effect of conjugation on the position of absorption of UV spectra.

5. Answer **any two** of the following :

10

- Complete the following reaction, suggest the mechanism and name it.



- Discuss Reimer-Tiemann reaction with mechanism.
- Give any one method of preparation of monochloroacetic acid. What is action of following reagents on it ?
 - AgOH (moist)
 - KI
 - KCN
 - NH₃/ethanol.



Spectroscopic Chart

Woodward's-Fieser's rules for calculating ultraviolet absorption maxima

A) For substituted dienes (Ethanol solution)

No.	Basic Value	λ_{max} (nm)
1)	Acyclic and heteroannular dienes	214
2)	Homoannular dienes	253
3)	Addition for each substituent	
	a) - R alkyl (including part of carbocyclic ring)	5
	b) - OR (alkoxy)	6
	c) - Cl, -Br	5
	d) - OCOR (acyloxy)	0
	e) - NR ₂ , (N - alkyl)	60
	f) - SR (S - alkyl)	30
	g) - CH = CH - additional conjugation i.e. extending conjugation	30
	h) If one double bond is exocyclic to one ring	5
	i) If exocyclic to two rings simultaneously	10

B) Rules for α, β - Unsaturated Enones (Ethanol Solution)

No.	Basic value	λ_{\max} (nm)
1)	Ketones: $-\overset{\beta}{\underset{ }{\text{C}}}=\overset{\alpha}{\underset{ }{\text{C}}}-\text{CO}-$ a) Acyclic or 6-membered ring b) 5-membered ring	 215 202
2)	Aldehydes $-\overset{ }{\text{C}}=\overset{ }{\text{C}}-\text{CHO}$	207
3)	Extended Conjugation $-\overset{\delta}{\underset{ }{\text{C}}}=\overset{\gamma}{\underset{ }{\text{C}}}-\overset{\beta}{\underset{ }{\text{C}}}=\overset{\alpha}{\underset{ }{\text{C}}}-\text{CO}-\text{etc.},$	30
4)	Homodiene component	39
5)	a) If one double bond is exocyclic to one ring b) If exocyclic to two rings simultaneously	5 10
6)	Addition for substituents	



Substituents	Position			
	α	β	γ	δ
a) - R alkyl (including part of carbocyclic ring)	10	12	18	18
b) - OR (alkoxy)	35	30	17	31
c) - OH (hydroxy)	35	30	-	50
d) - SR (thioether)	-	85	-	-
e) - Cl (chloro)	15	12	-	-
f) - Br (bromo)	25	30	-	-
g) - OCOR (acyloxy)	6	6	-	6
h) - NH ₂ , - NHR, - NR ₂	-	95	-	-

Solvent correction

	Solvent	
a)	Ethanol	0
b)	Methanol	0
c)	Dioxan	-5
d)	Chloroform	-1
e)	Ether	-7
f)	Water	+8
g)	Hexane	-11
h)	Cyclohexane	-11



Seat No.	
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**B.Sc. – II (Sem. – III) Examination, 2015
COMPUTER SCIENCE (New) (Paper – V)
Object Oriented Programming Using C++**

Day and Date : Tuesday, 19-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

1. Choose correct alternatives :

10

- 1) "One interface many forms" means
 - a) Encapsulation
 - b) Data abstraction
 - c) Polymorphism
 - d) None of the above
- 2) When function is redefined in derived class are called
 - a) Inline function
 - b) Outline function
 - c) Virtual function
 - d) Main function
- 3) _____ operator overloading works on two objects.
 - a) Unary operator overloading
 - b) Binary operator overloading
 - c) Ternary operator
 - d) None of these
- 4) _____ operator are used to allocate memory at run time.
 - a) Delete
 - b) Malloc
 - c) New
 - d) Realloc
- 5) _____ stream specifies input stream as well as output stream.
 - a) istream
 - b) ostream
 - c) ios
 - d) iostream
- 6) To represent current object _____ key words are used.
 - a) This
 - b) New
 - c) Static
 - d) Abstract
- 7) The operator << is known as
 - a) Insertion
 - b) External
 - c) Extreme
 - d) Extraction
- 8) _____ inheritance multiple base class and one derived class.
 - a) Multiple
 - b) Hierarchy
 - c) Single
 - d) Multi level



Seat No.	
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B.Sc. Part – II (Semester – III) Examination, 2015
CHEMISTRY (New)
Inorganic Chemistry Paper – VI

Day and Date : Wednesday, 20-5-2015

Max. Marks : 50

Time : 11.00 a.m. to 1.00 p.m.

- Instructions :** I) **All questions are compulsory.**
II) Draw **neat** diagram and give equations **whenever necessary.**
III) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for the following and rewrite the sentences : **10**
- 1) Ferrous ammonium sulphate is _____ salt.
a) simple b) double c) complex d) chelate
 - 2) Geometrical isomerism is also called _____ isomerism.
a) Optical b) Mirror image c) Cis-trans d) Symmetric
 - 3) The coordination number of Co in $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ is
a) Two b) Three c) Five d) Six
 - 4) EDTA is _____ dentate ligand.
a) mono b) bi c) tetra d) hexa
 - 5) More stable metal chelate generally contains _____ membered ring.
a) Four b) Five c) Six d) Seven
 - 6) Ammonia molecule is
a) Lewis acid b) Lewis base
c) Arrhenius acid d) None of these
 - 7) Sodium ion (Na^+) is the
a) Soft base b) Soft acid c) Hard base d) Hard acid
 - 8) HSAB concept of acid and base is based on _____ principle.
a) Pearson b) LCAO's c) Werner's d) Linus Pauling

P.T.O.



- 9) Paramagnetism is due to
- a) paired electrons
 - b) unpaired electrons
 - c) d-d- transition
 - d) none of these
- 10) The transition elements serves as a bridge between _____ block elements.
- a) s and p
 - b) p and d
 - c) d and f
 - d) s and d

2. Answer **any five** of the following : **10**

- i) Write the molecular formula of
 - a) Potassium trioxalatoaluminate (III)
 - b) Hexamine cobalt (III) chloride.
- ii) Define the terms :
 - a) Ligand
 - b) Coordination number
- iii) Give analytical applications of DMG.
- iv) Define chelation with suitable example.
- v) Give demerits of Lewis concept.
- vi) Explain Fe^{3+} is more stable than Fe^{2+} .

3. A) Answer **any two** of the following : **6**

- i) Explain the term coordination sphere.
- ii) Give postulates of VBT.
- iii) Why solution of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ is violet in colour ?

B) Differentiate metal chelate and metal complex. **4**

4. Answer **any two** of the following : **10**

- i) Give assumptions of Werner's theory.
- ii) Define acids and bases on the basis of Lewis theory. Give classification of Lewis acids and bases with suitable examples.
- iii) Define transition elements. Give names, symbols and electronic configuration of first transition series elements.

5. Answer **any two** of the following : **10**

- i) Explain formation of $[\text{Ni}(\text{CN})_4]^{2-}$ on the basis of VBT and comment on hybridisation; magnetic behavior and stability.
 - ii) Explain in detail oxidation states of first transition series elements.
 - iii) Discuss the magnetic behavior of 3d elements.
-



2. Attempt **any five** of the following :

10

- 1) If A and B are symmetric matrices of the same order then prove that $AB + BA$ is symmetric.

- 2) Reduce the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 2 & 1 & 2 \\ 2 & 1 & 3 \\ -2 & -1 & 4 \end{bmatrix}$ to its echelon form and find the rank.

- 3) Solve : $x + y + z = 0$, $2x + 5y + 6z = 0$.

- 4) Find eigen values of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and then find eigen vector.

- 5) Find all values of $(-1)^{1/3}$.

- 6) Prove that $\cosh^2 z - \sinh^2 z = 1$.

- 7) Prove that $1 + \sin [\log_e(i^i)] = 0$.

3. A) Attempt **any two** of the following :

10

- 1) Reduce the matrix $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 3 & -2 & 1 \\ 2 & 0 & -3 & 2 \\ 3 & 3 & -3 & 3 \end{bmatrix}$ to its normal form and then find its rank.

- 2) Test for consistency and solve $x_1 - 2x_2 + x_3 - x_4 = -1$, $3x_1 - 2x_3 + 3x_4 = 4$, $5x_1 - 4x_2 + x_4 = 2$.

- 3) If $\cos(\alpha + i\beta) = x + iy$ then prove that

$$\frac{x^2}{\cosh^2 \beta} + \frac{y^2}{\sinh^2 \beta} = 1 \text{ and } \frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1.$$

B) Attempt **any one** of the following :

10

- 1) State and prove Cayley-Hamilton theorem and find A^{-1} , $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$.

- 2) State and prove De Moivre's Theorem. Hence show that cube roots of unity are in G.P. and their sum is zero.

SECTION – II
(Calculus)1. Select the correct alternative for **each** of the following :

5

1) Find the $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{x} =$ _____

- a)
- $\log 3$
- b)
- $\log 2$
- c)
- $\log \left(\frac{3}{2}\right)$
- d)
- $\frac{3}{2}$

2) If $y = \sin(2x + 3)$ then $y_n =$ _____

a) $2^n \sin\left(2x + 3 + \frac{n\pi}{2}\right)$ b) $2^n \cos\left(2x + 3 + \frac{n\pi}{2}\right)$

c) $3^n \sin\left(2x + 3 + \frac{n\pi}{2}\right)$ d) $3^n \cos\left(2x + 3 + \frac{n\pi}{2}\right)$

3) The value of $\int_0^{\pi/2} \sin^6 x \, dx =$ _____

- a)
- $\frac{5}{32}$
- b)
- $\frac{5\pi}{32}$
- c)
- $\frac{5\pi}{96}$
- d)
- $\frac{5}{96}$

4) If $\vec{r} = xi + yj + zk$ then $\text{div } \vec{r} =$ _____

- a) 0 b) 1 c) 2 d) 3

5) If $u = \frac{x^{1/3} + y^{1/3}}{x^{1/2} + y^{1/2}}$ is homogeneous function then its degree = _____

- a)
- $-\frac{1}{6}$
- b)
- $\frac{1}{3}$
- c)
- $\frac{1}{2}$
- d)
- $\frac{1}{6}$

2. Attempt **any five** of the following :

10

1) Evaluate $\lim_{x \rightarrow a} \frac{\log(x - a)}{\log(e^x - e^a)}$.

2) If $y = \frac{x}{(x^2 - a^2)}$ then find n^{th} derivative of y .



3) Examine for continuity $f(x,y) = \frac{xy}{x^2 + y^2}$, $x^2 + y^2 \neq 0$
 $= 0$, otherwise

4) Evaluate $\int_0^{\pi/6} \cos^4 3x \sin^2 6x \, dx$.

5) Find the directional derivative of $\phi(x,y,z) = xy^2 + yz^3$ at the point $(2, -1, 1)$ in the direction of the vector $i + zj + 2k$.

6) State Taylor's theorem and Maclaurin's theorem.

7) If $z = x^3 + y^3 - 39xy$ then prove that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$.

3. A) Attempt **any two** of the following :

10

1) Obtain the series expansion of

i) e^x

ii) $\cos x$

2) If $\vec{r} = xi + yj + zk$ and 'r' is the modulus of \vec{r} then prove that $\text{div grad } r^n = n(n+1)r^{n-2}$.

3) If $u = \log v$ and $v = x^3 - x^2y - xy^2 + y^3$ then prove that

i) $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = \frac{2}{x+y}$

ii) $\frac{\partial^2 u}{\partial x^2} + 2 \frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = \frac{-4}{(x+y)^2}$

B) Attempt **any one** of the following :

10

1) State and prove Leibnitz's theorem and hence if $y = \sin^{-1}x$ then prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$.

2) State Euler's theorem on homogeneous function $f(x, y)$ and verify it for the

function $f(x, y) = \frac{x^{1/3} + y^{1/3}}{x^{1/4} + y^{1/4}}$



Seat No.	
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**B.Sc. – II (Semester – III) (New) Examination, 2015
COMPUTER SCIENCE (Paper – VI)
RDBMS**

Day and Date : Wednesday, 20-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **All questions carries equal marks.**

1. Choose correct alternatives : 10
- 1) Insert, update and delete are related with
a) DDL b) DML c) DCL d) All of these
 - 2) Which of the following can be defined at table level only ?
a) Composite primary key b) Unique key
c) Primary key d) Foreign key
 - 3) Which SQL keyword is used to sort the result set ?
a) Order b) Sort c) Order by d) None
 - 4) Single row in a table is called
a) field b) entity c) tuple d) attribute
 - 5) A PL/SQL block begins with _____ section.
a) end b) start c) main d) declare
 - 6) For single line comment in PL/SQL Xon can use
a) -- b) // c) /* d) All of these
 - 7) Which of the following attribute is used to declare variable based on definition of column ?
a) % row type b) % type c) type d) int
 - 8) The _____ constraint can only be applied at column level.
a) Not null b) Primary key c) Foreign key d) None of these
 - 9) _____ group function ignores null values.
a) max () b) count () c) sum () d) count (*)
 - 10) Select '2 + 5' from dual what will be displayed ?
a) 2 – 5 b) 2 c) 5 d) 7



2. Answer **any five** of the following : **10**
- a) Write attributes of implicit cursor.
 - b) Define attribute and tuple.
 - c) Explain while loop with example.
 - d) Differentiate ceil (n) and floor (n).
 - e) What is cursor ? What are its advantages ?
 - f) Explain use of sequence.
3. A) Answer **any two** of the following : **6**
- a) Differentiate truncate table and delete table.
 - b) Write and explain structure of PL/SQL.
 - c) Explain check constraint.
- B) What is view ? Explain with example. **4**
4. Answer **any two** of the following : **10**
- a) Write procedure for addition of two numbers.
 - b) What is join ? Explain different types of join.
 - c) What is trigger ? How it is works ?
5. Answer **any two** of the following : **10**
- a) Explain any three aggregate functions.
 - b) Explain components of DBMS.
 - c) Comment on role of DBA.
-



3. A) Answer **any two** of the following : **6**
- i) Explain scalar and vector fields.
 - ii) Obtain an equation for period of gyroscope.
 - iii) Give construction and working of pressure microphone.
- B) Obtain an equation for change in entropy. **4**
4. Answer **any two** of the following : **10**
- i) What is divergence of vector field and give its physical significance ?
 - ii) Obtain an equation for angle of lean of rolling disc.
 - iii) Obtain an equation for coefficient of viscosity by rotating cylinder method.
5. Answer **any one** of the following : **10**
- i) What is flat spiral spring ? Obtain an expression for Young's modulus of material of flat spiral spring.
 - ii) Explain production of ultrasonic waves by piezo-electric method. Give any five applications of ultrasonics.
-



- 8) Night blindness is an early sign of vitamin _____ deficiency.
a) A b) B₁ c) C d) D
- 9) _____ is not a terpene or its derivative.
a) Geraniol b) Thymol c) Quinone d) Cerebroside
- 10) Triglycerides are the esters of fatty acids with _____.
a) Cholesterol b) Glycerol
c) Long chain aliphatic alcohols d) Phosphate

2. Answer **any five** from below : 10

- 1) How is the pI of a neutral amino acid calculated ?
- 2) Name the subclasses of scleroproteins with examples.
- 3) Explain the geometric specificity of an enzyme.
- 4) State the names of four coenzymes involved in redox reactions.
- 5) Define – Oligosaccharides.
- 6) What are nucleoproteins ? Give two examples.

3. A) Attempt **any two** from below : 6

- 1) Explain the reducing nature of monosaccharides.
- 2) Give differences between fat soluble and water soluble vitamins.
- 3) What is the effect of Vitamin A deficiency on vision ?

B) Write an account of oxidoreductases class of enzymes. 4

4. Answer **any two** from below : 10

- 1) Explain globular proteins in detail.
- 2) Write an account of phospholipids and spingolipids.
- 3) Describe the titration curve of glycine.

5. Answer **any two** from below : 10

- 1) Illustrate the effect of substrate concentrated on enzyme catalysed reaction.
 - 2) Classify carbohydrates with one example of each class.
 - 3) Discuss about derived monosaccharides.
-



- 6) _____ is a wild variety of groundnut.
a) T.G.– I b) S.B. II c) Karad-4-II d) Bambara
- 7) _____ is a vegetable crop.
a) Cabbage b) Gerbera c) Grape d) Groundnut
- 8) Heat and solarization is used in _____ method of plant protection.
a) Cultural b) Physical c) Mechanical d) Chemical
- 9) Taillage is _____ method of plant protection.
a) Biological b) Cultural c) Mechanical d) Physical
- 10) Sowing seeds by 3 tyred drill (pabhar) is called _____
a) Dibbling b) Drilling
c) Sowing in furrows d) Broadcasting

2. Answer **any five** of the following.

10

- i) What is crop rotation ?
- ii) What is the use of resistant varieties ?
- iii) Give economic importance of cotton.
- iv) Write the morphology of Jowar crop.
- v) What are trap crops ?
- vi) Write the use of Rhodenticide.

3. A) Answer **any two** of the following.

6

- i) Explain the morphology of Gram crop.
- ii) Give the economic importance of groundnut and sunflower.
- iii) Write a note on Insecticides.

B) Give an account of plant quarantine.

4



4. Answer **any two** of the following. **10**

- i) Describe the sugarcane crop with reference to morphology, soil types and fertilizers.
- ii) Give an account of any two mechanical methods of plant protection.
- iii) Describe 'Tur' crop w.r.t. cultivation yield and economic importance.

5. Answer **any two** of the following. **10**

- i) Give an account of Biological methods of plant protection.
 - ii) Give brief account of fungicides and bactericides.
 - iii) Describe the cultivation of Rose w.r.t. soil types, tillage, yield and economic importance.
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Seat No.	
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B.Sc. – II (Semester – III) (New) Examination, 2015
PHYSICS
Electronics (Paper – VI)

Day and Date : Friday, 22-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- Instructions :**
- 1) **All questions are compulsory.**
 - 2) **Figures to the right indicate full marks.**
 - 3) **Neat diagrams must be drawn wherever necessary.**
 - 4) **Use of log table and calculator is allowed.**

1. Select the correct alternative from the following :

10

- i) Negative voltage feedback _____ gain.
 - a) Increases
 - b) Decreases
 - c) Keeps the same
 - d) None of these
- ii) An oscillator converts
 - a) A.C. Power into D.C. Power
 - b) D.C. Power into A.C. Power
 - c) Mechanical power into A.C. Power
 - d) None of these
- iii) A UJT is sometimes called _____ diode.
 - a) Low resistance
 - b) High resistance
 - c) Single base
 - d) Double-based
- iv) In a J-K, Flip-Flop, $J = 1$, $K = 1$ output of J-K Flip-Flop Q_{n+1} is
 - a) 1
 - b) 0
 - c) Q_n
 - d) $\overline{Q_n}$

P.T.O.



- v) % Load regulation is equal to
- $V_{FL} - V_{NL} \times 100\%$
 - $V_{NL} - V_{FL} \times 100\%$
 - $\frac{V_{NL} - V_{FL}}{V_{FL}} \times 100\%$
 - $\frac{V_{NL} - V_{FL}}{V_{NL}} \times 100\%$
- vi) IC 7815 is a _____ volt regulator.
- +5
 - 5
 - +15
 - 78
- vii) The process of injecting a fraction of output energy back to the input is known as
- Oscillator
 - Amplifier
 - Feedback
 - Rectifier
- viii) Circuit that provides the best stabilization of the operating point is
- Base resistor bias
 - Collector feedback bias
 - Potential divider bias
 - None of these
- ix) In phase-shift oscillator, the feedback factor β is
- $\frac{1}{20}$
 - $\frac{1}{29}$
 - $\frac{1}{25}$
 - $\frac{1}{10}$
- x) A CRO is used to measure
- Voltage
 - Frequency
 - Phase
 - All of these

2. Answer **any five** of the following :

10

- Define the term feedback and state Barkhausen criterion for sustained oscillations.
- Draw a logical circuit for R – S, Flip-Flop and write its truth table.
- Write any four differentiating points between normal amplifier and differential amplifier.
- Draw the logical circuit of J-K Flip-Flop.
- State the Demorgan's theorems.
- Draw an equivalent circuit of a UJT.



3. A) Answer **any two** of the following : **6**
- i) Explain the working of full adder logic diagram and truth table.
 - ii) What is an oscillator ? Find the frequency of transistorised phase shift oscillator if $R_1 = R_2 = R_3 = R = 10\text{ K}\Omega$ and $C_1 = C_2 = C_3 = C = 0.01\ \mu\text{f}$.
 - iii) Explain the construction of UJT and explain how it can be used as voltage sweep generator.
- B) Determine the operating frequency and feedback fraction in Colpitt's oscillator with $C_1 = 0.001\ \mu\text{f}$, $C_2 = 0.01\ \mu\text{f}$ and $L = 15\ \mu\text{H}$. **4**
4. Answer **any two** of the following : **10**
- i) Draw the transistor series voltage regulator and explain its working.
 - ii) Describe the working of the crystal oscillator with transistorised circuit diagram.
 - iii) Draw the circuit for RC coupled amplifier and explain its working with advantages.
5. Answer **any one** of the following : **10**
- i) Draw the neat circuit diagram of dual power supply using three terminal IC's and explain its working in detail.
 - ii) Explain principle, construction and working of Cathode Ray Oscilloscope (C.R.O.) in detail.
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Seat No.	
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B.Sc. – II (Semester – III) Examination, 2015
BIOCHEMISTRY (Paper – II) (New)
Biochemical Techniques

Day and Date : Friday, 22-5-2015

Max.Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right hand side indicate full marks.**
3) **Draw labelled diagrams wherever necessary.**

1. Write following sentences selecting most correct answer from the given options : **10**

- 1) In thin layer chromatography the glass plate is used as
 - a) An adsorbent
 - b) A stationary phase
 - c) A support
 - d) A binder
- 2) In HPLC pulseless flow is obtained using
 - a) Pressure gauze
 - b) Pressure dampener
 - c) High pressure pump
 - d) Solvent filter
- 3) In starch gel electrophoresis _____ is used as a marker dye to monitor the migration of proteins.
 - a) Bromophenol blue
 - b) Bromocrysol green
 - c) Amidoblack 10B
 - d) Oil red O
- 4) Glutaraldehyde is used to immobilise enzymes by
 - a) Adsorption
 - b) Intermolecular cross-linking
 - c) Covalent binding
 - d) Entrapment in polymer gel
- 5) The techniques used for blot transfer of DNA is called _____ blotting technique.
 - a) Southern
 - b) Western
 - c) Northern
 - d) Eastern



3. A) Attempt **any two** : **6**
- 1) State the medium used for production of hybridoma cells. What is its significance ?
 - 2) State three stages of temperature control in thermal cycler.
 - 3) What is trade mark and trade secrete ?
- B) Draw a labelled diagram of construction of spectrophotometer. **4**
4. Answer **any two** from below : **10**
- 1) Explain the preparation of HPLC column and its mechanism of separation of components from a mixture.
 - 2) Describe Direct Antibody Coating (DAC) ELISA technique.
 - 3) Discuss various applications of SDS-PAGE.
5. Attempt **any two** : **10**
- 1) Describe construction and working of colorimeter.
 - 2) Discuss preparation of starch gel plate, application of sample and mechanism of separation by starch gel electrophoresis.
 - 3) What are the various applications of immobilised enzymes ?
-



Seat No.	
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B.Sc. – II (Semester – III) (New) Examination, 2015
PLANT PROTECTION (Paper – II)
Crop Diseases and Their Management

Day and Date : Friday, 22-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

Instructions : i) **All questions are compulsory.**
ii) **Draw a neat labelled diagrams wherever necessary.**
iii) **Figures to the right indicate full marks.**

1. Rewrite the sentences by selecting correct answer from the given alternative : **10**
- 1) Early blight of tomato is a _____ disease.
a) fungal b) bacterial c) viral d) mycoplasma
 - 2) Sphacelotheca sorghi causes grain smut disease of _____
a) sugarcane b) jawar c) bhendi d) brinjal
 - 3) Groundnut disease affect with _____
a) rust b) smut c) rust-smut d) none of these
 - 4) Rust of soyabean is a _____ disease.
a) bacterial b) viral c) mycoplasma d) fungal
 - 5) Downy mildew of grapes is control by _____ mixture.
a) 4% Bordeaux b) 3% Bordeaux c) 2% Bordeaux d) 1% Bordeaux
 - 6) Two species of Erysiphaceae have been reported to cause powdery mildew of cucurbits in _____
a) Australia b) India c) China d) Japan
 - 7) Wilt of tomato is a _____ disease.
a) bacterial b) viral c) fungal d) mycoplasma
 - 8) Xanthomonas citri is a _____ shaped bacteria.
a) Oval b) Ovate c) Rod d) Spiral
 - 9) Leaf curl disease occur on _____ plant.
a) Bhendi b) Brinjal c) Jawar d) Chilli
 - 10) Yellow Vein mosaic of _____ is a viral disease.
a) okra b) wheat c) bajra d) maize



2. Answer **any five** of the following : **10**
- i) What is crop disease ?
 - ii) Define plant pathology.
 - iii) What is resistance ?
 - iv) Define incubation.
 - v) Name any two viral disease.
 - vi) Define protection.
3. A) Answer **any two** of the following : **6**
- i) Explain the mode of infection of plant protection.
 - ii) Give the symptoms and causal organism of grassy shoot of sugarcane.
 - iii) Explain the causal organism and control measures of little leaf of brinjal.
- B) Give the classification of plant diseases based on pathogen. **4**
4. Answer **any two** of the following : **10**
- i) Explain the symptoms, causal organism and control measures of yellow vein mosaic of bhendi.
 - ii) Describe the principle of plant disease management.
 - iii) What is plant infection ? Explain the factor affecting the infection studied by you.
5. Answer **any two** of the following : **10**
- i) What is transmission ? Describe the mode of transmission through air and insect.
 - ii) Describe the symptoms, causal organism and control measures of leaf curl of chilli.
 - iii) Give the symptoms, causal organism and control measures of citrus canker.
-



6) If X is a continuous random variable with pdf $f(x)$, then HM of X is

- a) $E\left(\frac{1}{X}\right)$ b) $\frac{1}{E(X)}$ c) $\frac{1}{E\left(\frac{1}{X}\right)}$ d) none of these

7) If $F_{X,Y}(x, y)$ is the cdf of bivariate random variable (X, Y) , then

$F_{X,Y}(-\infty, y) = F(x, -\infty)$ is equal to

- a) 0 b) 1 c) ∞ d) none of these

8) If X follows uniform distribution over $(0, 1)$, then its mean is

- a) 0 b) 1 c) $\frac{1}{2}$ d) none of these

9) The range of exponential distribution is

- a) 0 to 1 b) 0 to ∞ c) $-\infty$ to ∞ d) none of these

10) MGF of exponential distribution with parameter θ is

- a) $\left(1 - \frac{t}{\theta}\right)^{-1}$ b) $\left(1 - \frac{t}{\theta}\right)^{-2}$ c) $\left(1 - \frac{t}{\theta}\right)$ d) none of these

2. Attempt **any five** of the following :

10

For a continuous random vector (X, Y) define :

- i) Joint pdf of (X, Y) .
- ii) Marginal p.d.f of X .
- iii) Expectation of $g(X, Y)$.
- iv) Conditional expectation of X given $Y = y$.
- v) Conditional variance of X given $Y = y$.
- vi) $\text{Cov}(X, Y)$.



3. a) Attempt **any two** of the following : 6

i) A continuous r.v. X has pdf $f(x) = \begin{cases} kx & ; 0 \leq x \leq 1 \\ 0 & ; \text{ow} \end{cases}$

Find k, mean and variance of X.

ii) State the properties of cumulative distribution of X.

iii) For a given joint pdf of (X, Y) $f(x, y) = \begin{cases} \frac{3}{2}y^2 & ; 0 \leq x \leq 2; 0 \leq y \leq 1 \\ 0 & ; \text{ow} \end{cases}$

Verify whether X and Y are independent ?

b) State and prove additive theorem of expectation. 4

4. Attempt **any two** of the following : 10

i) The pdf of a continuous r.v. X is $f(x) = \begin{cases} kx(2-x) & ; 0 \leq x \leq 2 \\ 0 & ; \text{ow} \end{cases}$

Find k, mean and mode of X.

ii) If $X \sim U(a, b)$, find the distribution of $Y = \frac{X-a}{b-a}$.

iii) Let (X, Y) be a two-dimensional continuous r.v. with joint p.d.f $f(x, y) = \begin{cases} ke^{-(x+y)} & ; x \geq 0, y \geq 0 \end{cases}$ Find k, also obtain marginal p.d.f of X and Y.

5. Attempt **any two** of the following : 10

i) A continuous r.v. X has pdf $f(x) = \begin{cases} 1 & ; 0 \leq x \leq 1 \\ 0 & ; \text{ow} \end{cases}$

Find the distⁿ of $Y = -2 \log_e X$.

ii) Let a random variable X has U (0, θ) distribution. Find the cdf of X and hence determine median of X.

iii) Define exponential distribution with parameter θ . Find its m.g.f.



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B.Sc. – II (Sem. – III) Examination, 2015
GEOCHEMISTRY (Paper – I)
Introduction to Geochemistry (New)

Day and Date : Saturday, 23-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

I. Choose the **correct** answer for the following : **10**

- 1) Gibbs free energy (G) is significant in connection with processes that take place at constant
 - a) Pressure
 - b) Temperature
 - c) Pressure and Temperature
 - d) None
- 2) Which of the following mineral pair does not belong to isomorphic phenomenon ?
 - a) Sodaniter – Calcite
 - b) Niter – Aragonite
 - c) Pyrope – Almandine
 - d) Microcline – orthoclase
- 3) Rare earth elements are also termed as
 - a) Actinides
 - b) Lanthanides
 - c) Alkanides
 - d) Halogens
- 4) When the radius ratio $R_{\text{cation}}/R_{\text{anion}}$ is between 0.73 and 1 the arrangement of anions around cation shall be as
 - a) Corners of an equilateral triangle
 - b) Corners of tetrahedron
 - c) Corners of a cube
 - d) Corners of an octahedron
- 5) In sheet silicates the Si : O ratio is
 - a) 1 : 4
 - b) 1 : 3
 - c) 2 : 5
 - d) 1 : 2
- 6) The radius of K^+ is
 - a) 1.38 \AA
 - b) 1.49 \AA
 - c) 1.70 \AA
 - d) 1.86 \AA

P.T.O.



- 7) The maximum number of crystalline phases that can coexist in rocks in stable equilibrium is equal to the number of components was proposed by
a) Winkler b) Lawson c) Goldschmidt d) Clarke
- 8) Marcasite and pyrite are polymorphs marcasite may invert to pyrite but pyrite never changes to marcasite, such polymorphs are called as
a) Enantiotropic b) Monotropic
c) Both a) and b) d) None
- 9) As a general rule in ionic substitution the maximum size and maximum charge difference should not exceed
a) 15% and unity b) 20% and two
c) 30% and three d) None
- 10) What are the terms used in substitution of major ion by minor ion as proposed by Goldschmidt ?
a) Capture b) Admittance c) Camouflaged d) All the above

II. Answer **any five** of the following : **10**

- 1) Caesium chloride stability
- 2) Radius ratio and coordination
- 3) Covalent bond
- 4) Principles of crystal structure
- 5) Phase rule
- 6) Neso silicate

III. A) Answer **any two** of the following : **6**

- 1) Pauling rule of crystal structure.
- 2) Omission solid solution
- 3) Double chain silicates

B) Write on Goldschmidt rules of atomic substitutions. **4**

IV. Answer **any two** of the following : **10**

- 1) Polymorphism in silicates
- 2) Tecto silicates
- 3) Electronegativity

V. Answer **any two** of the following : **10**

- 1) Structure of sorosilicate.
 - 2) Lattice energy of crystals
 - 3) Radii of common major ions in rock forming minerals.
-



SLR-R – 9

Seat No.	
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B.Sc. I (Semester – I) (CGPA Pattern) Examination, 2015
BOTANY (Paper – I)
Microbiology and Cryptogams, Plant Physiology and Horticulture

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N.B. :** 1) **All questions are compulsory.**
2) Write **two** Sections in **separate** answer books.
3) Draw **neat** and labelled diagrams **wherever** necessary.
4) Figures to the **right** indicate **full** marks.

SECTION – I

(Microbiology and Cryptogams)

1. Rewrite the following sentences by choosing correct alternative : 5
- 1) Virology is study of
a) viruses b) bacteria c) algae d) fungi
 - 2) Agar-agar is obtained from _____ algae.
a) Nostoc b) Volvox c) Gracilaria d) Spirogyra
 - 3) White-rust of crucifer is caused by
a) Ustilago b) Puccinia c) Peziza d) Albugo
 - 4) _____ plants are non-vascular plants.
a) Bryophyte b) Pteridophyte c) Gymnosperm d) Angiosperm
 - 5) Ligulate leaves are found in
a) Riccia b) Anthoceros c) Selaginella d) Nostoc
2. Answer **any five** of the following : 10
- i) What is mycoplasma or phytoplasma ?
 - ii) Which algae are used as biofertilizer ?

P.T.O.



- iii) What is Lichen ?
 - iv) Sketch and label T.S. of Riccia thallus.
 - v) Give systematic position of Selaginella.
 - vi) What is bacteria ?
 - vii) Give longform of PPLO and MLO.
3. A) Write short notes **any two** of the following : 10
- i) Sexual reproduction in Spirogyra.
 - ii) Strobilus of Selaginella.
 - iii) Economic importance of Fungi.
- B) Answer **any one** of the following : 10
- i) Give economic importance of Algae.
 - ii) Describe the sexual reproduction and sex organs of Riccia.

SECTION – II

(Plant Physiology and Horticulture)

1. Rewrite the following sentence by choosing correct alternative. 5
- 1) The branch of floriculture, which deals with cultivation, processing and marketing of floral crops is called
a) Pomoculture b) Floriculture c) Olericulture d) Agriculture
 - 2) Nitrogen is a _____ element.
a) Micro b) Macro c) Nano d) None of these
 - 3) The growth curve is usually _____ shaped curve.
a) V b) α c) S d) β
 - 4) _____ is a co-enzyme.
a) Mg^{++} b) Fe^{++} c) NADP d) Ca^{++}
 - 5) _____ is artificial method of vegetative propagation.
a) cutting b) offset c) tuber d) bulb



2. Answer **any five** of the following : 10
- i) Define microelements.
 - ii) What is vernalization ?
 - iii) Enlist any four natural means of vegetative propagation.
 - iv) What are enzymes ?
 - v) Define cutting.
 - vi) Mention any two roles of CCC in agriculture.
 - vii) What is mean by pomoculture ?
3. A) Write short notes on **any two** of the following : 10
- i) Physicochemical structure of enzyme.
 - ii) 'T' budding.
 - iii) Photoperiodism.
- B) Answer **any one** of the following : 10
- i) Discuss the requirements of rose with respect to soil type, manures, irrigation and control measures of diseases.
 - ii) What is vegetative propagation ? Explain the technique of approach grafting and whip grafting.
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B.Sc. (Part – II) (Semester – III) Examination, 2015
ZOOLOGY (Paper – V) (New)
Animal Diversity – III

Day and Date : Saturday, 23-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- Instructions:** 1) **All** questions are **compulsory**.
2) Figures to **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.
4) Write the question number attempted in the margin.

1. Select the appropriate answer from those given below **each** question and rewrite the sentences :

10

- i) Cockroach belongs to class _____
a) Myriapoda b) Arachnida c) Insecta d) Gastropoda
- ii) Heart of pila consists of _____ chambers.
a) 2 b) 3 c) 4 d) 6
- iii) Siphoning type of mouth parts are present in _____
a) Housefly b) Mosquito c) Butterfly d) Honeybee
- iv) Tornaria is larval stage of _____
a) Annelida b) Mollusca
c) Hemichordata d) Arthropoda
- v) Elephantiasis is caused by _____ worms.
a) Wuchereria bancrofti b) Plasmodium vivax
c) Aedes aegypti d) Plasmodium ovale
- vi) In Aplysia the foot is used for _____
a) boring b) digging c) creeping d) swimming
- vii) Gizzard of cockroach has _____ number of teeth.
a) 6 b) 4 c) 3 d) 5



Seat No.	
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B.Sc. – II (Semester – III) (New) Examination, 2015
STATISTICS (Paper – VI)
Discrete Probability Distributions and Statistical Methods

Day and Date : Monday, 25-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

Instructions : 1) **All questions are compulsory and carry equal marks.**
2) **Figures to the right indicate full marks.**

1. Choose the correct alternative : 10
- i) The distribution possessing the memoryless property is
- a) Poisson distribution b) Geometric distribution
c) Hypergeometric distribution d) All the above
- ii) The partial correlation coefficient $r_{13.2}$ is called
- a) First order partial correlation b) Zero order partial correlation
c) Second order partial correlation d) None of these
- iii) The range of multiple correlation coefficient is
- a) -1 to $+1$ b) $-\infty$ to ∞
c) 0 to ∞ d) 0 to $+1$
- iv) A measure of linear association of a variable say X , with a number of other variables X_2, X_3, \dots, X_k is known as
- a) Partial correlation b) Simple correlation
c) Multiple correlation d) Auto correlation
- v) If $X \sim \text{Geo}(p)$ then $P(X \geq 3) =$
- a) q^3 b) p^3
c) pq^3 d) p^3q



vi) The order of the residual $X_{2.13}$ is

- a) One b) Two c) Three d) Four

vii) Binomial distribution tends to Poisson distribution when

- a) $n \rightarrow \infty, p \rightarrow 0$ and $np = \mu$ (finite) b) $n \rightarrow \infty, p \rightarrow \frac{1}{2}$ and $np = \mu$ (finite)

- c) $n \rightarrow 0, p \rightarrow 0$ and $np = 0$ d) $n \rightarrow 15, p \rightarrow 0$ and $np = 0$

viii) If the value of multiple correlation coefficient R is near to one, it leads to the conclusion that

- a) There is a lack of linear relationship
 b) Linear relation is a good fit
 c) There is curvilinear relation
 d) All of these

ix) If $V(X_{1.23}) = 0$ then $R_{1.23} = \underline{\hspace{2cm}}$

- a) 0 b) 1 c) 0.5 d) None of these

x) A family of parametric distribution in which mean is equal to variance is

- a) Binomial distribution b) Geometric distribution
 c) Normal distribution d) Poisson distribution

2. Solve **any five** out of **six** :

10

i) Find r and p if $X \sim NB(r, p)$ such that $E(X) = 15$ and $V(X) = 60$.

ii) In a trivariate data $r_{12} = 0.6$ $r_{13} = -0.4$ $r_{23} = 0.7$. Are these values consistent.

iii) Find pmf of geometric distribution with parameter p .

iv) Find mean and variance of waiting time distribution.

v) Prove that the sum of two independent Poisson variates is a Poisson variate.

vi) Show that geometric distribution is a particular case of negative binomial distribution.



3. A) Answer **any two** of the following : **6**
- i) Define the residual $X_{1.23}$ and prove that $X_{3.12}$ is uncorrelated with X_1 .
 - ii) For a Poisson distribution $P[X = 1] = 0.03$ and $P[X = 2] = 0.15$. Find $P[X = 0]$ and $P[X = 3]$.
 - iii) With usual notations prove that $1 - R_{1.23}^2 = (1 - r_{12}^2)(1 - r_{13.2}^2)$.
- B) State and prove the recurrence relation for probabilities of negative binomial distribution. **4**
4. Solve **any two** out of **three** : **10**
- i) Obtain the probability generating function (pgf) of negative binomial distribution and hence find its mean and variance.
 - ii) Derive Poisson distribution as a limiting form of a binomial distribution.
 - iii) Obtain variance of residual in terms of simple correlation coefficients.
5. Solve **any two** out of **three** : **10**
- i) Obtain the expression for multiple correlation coefficient $R_{1.23}$ in terms of total correlation coefficients r_{12} , r_{13} and r_{23} .
 - ii) With usual notations prove that $R_{1.23}^2 = b_{12.3} r_{12} \frac{\sigma_2}{\sigma_1} + b_{13.2} r_{13} \frac{\sigma_3}{\sigma_1}$.
 - iii) If X and Y are two independent Poisson variates then show that conditional distribution of X given (X + Y) is binomial.
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**B.Sc. – II (Sem. – III) Examination, 2015
GEOCHEMISTRY**

Paper – II : Introduction to Solar System and Geosphere (New)

Day and Date : Monday, 25-5-2015

Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams wherever necessary.**

I. Choose the correct answer for **each** of the following : **10**

- 1) Find the odd element from the group-lithophile.
a) Ca b) K c) Na d) Fe
- 2) Consumption of fossil fuel leads to
a) increase in plant productivity
b) global warming
c) biodiversity
d) all the above
- 3) Which of the following is oxysphere ?
a) lithosphere b) asthenosphere
c) siderosphere d) none
- 4) The simplest way of expressing geochemical model of atmosphere is by the concentration of
a) H, O, C b) He, Ar, C
c) N, O, Ar d) None
- 5) What percentage of volume of oxygen is present in the continental crust ?
a) 20 b) 10 c) 30 d) 100
- 6) The most abundant element in the universe is
a) Cu b) Pb c) Zn d) H

P.T.O.



- 7) Apart from concentration of an element, which other aspect is important in geochemical cycle ?
a) residence time b) temperature c) pressure d) none
- 8) The basis on which Clarke and Washington had proposed the geochemical model of crust is
a) 5159 superior analysis b) primary differentiation
c) mobility of elements d) all the above
- 9) Find the odd one out.
a) Ar b) N c) O d) Ca
- 10) If the chlorinity has to be determined, what chemical is a must from the following ?
a) AgNO_3 b) CuSO_4 c) HCl d) None

II. Answer **any five** of the following : 10

- a) Atmosphere
- b) Composition of chondrite
- c) Ozone depletion
- d) Salinity of oceans
- e) Tropopause
- f) Geochemical cycle.

III. A) Answer **any two** of the following : 6

- 1) Cosmic abundance of elements.
- 2) Difference between average composition of sea water and river water.
- 3) Nature of hydrosphere.

B) Evolution of the atmosphere. 4

IV. Answer **any two** of the following : 10

- 1) Temperature variation in atmosphere.
- 2) Primary differentiation.
- 3) Classification of geochemical elements.

V. Answer **any two** of the following : 10

- 1) Gains and losses to atmosphere.
 - 2) Gains and losses to ocean waters.
 - 3) Geochemical model of the earth as a whole.
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B.Sc. – II (Semester – III) Examination, 2015
ZOOLOGY (New) (Paper – VI)
Cell Science Genetics, Biological Chemistry and Economic Zoology

Day and Date : Monday, 25-5-2015
Time : 3.00 p.m. to 5.00 p.m.

Max. Marks : 50

- N.B.** : 1) **All questions are compulsory.**
2) Draw **neat** and labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Rewrite the sentences by selecting appropriate answer. 10
- 1) In Meiosis, pairing of homologous Chromosomes take place during _____
 - a) Leptotene
 - b) Zygotene
 - c) Pachytene
 - d) All of the above
 - 2) The pH below 7 is _____
 - a) Acidic
 - b) Basic
 - c) Neutral
 - d) All of the above
 - 3) m-RNA is a complimentary copy of
 - a) Ribosomal RNA
 - b) Ribosomal DNA
 - c) Single standed DNA
 - d) t-RNA
 - 4) Worker of Honeybee are _____
 - a) Sterile male
 - b) Starile female
 - c) Fertile male
 - d) Fertile female
 - 5) Stiffing is related with _____
 - a) Sericulture
 - b) Apiculture
 - c) Lac culture
 - d) Fish culture
 - 6) Ranikhet is caused by _____
 - a) Fungus
 - b) Bacteria
 - c) Tick
 - d) Virus



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B.Sc. – II (Semester – III) Examination, 2015
MATHEMATICS (Paper – V) (New)
Differential Calculus

Day and Date : Tuesday, 26-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Select **correct** alternative for **each** of the following : **10**
- 1) Polar subtangent for the curve $r = a\theta$ is
- a) $\frac{r^2}{a}$ b) a c) $\frac{a}{r^2}$ d) $\frac{1}{a}$
- 2) Angle of intersection of curves $r = a(\cos\theta + 1)$, $r = a(1 - \sin\theta)$ is
- a) π b) $\frac{\pi}{2}$ c) 0 d) $-\frac{\pi}{2}$
- 3) Pedal equation of the curve $r = ae^{\theta \cot \alpha}$ is
- a) $p = r \sin \alpha$ b) $p = r \cos \alpha$
c) $p = r$ d) $p = r \sin 2\alpha$
- 4) If $x = r \cos \theta$, $y = r \sin \theta$ then $\frac{\partial(x,y)}{\partial(r,\theta)} = \dots$
- a) x b) y c) r d) θ
- 5) If $x = u(1 + v)$ and $y = v(1 + u)$ then $\frac{\partial(x,y)}{\partial(u,v)} = \dots$
- a) $u + v$ b) $u - v$ c) $1 + u + v$ d) $u + v - 1$
- 6) The radius of curvature at any point on the curve $s = c \cdot \tan \psi$ is
- a) $c + \frac{s^2}{c}$ b) $c + \frac{c^2}{s}$ c) $c - \frac{s^2}{c}$ d) None of these



3. A) Attempt **any two** from the following : 6

1) Show that, the curves $lx^2 + my^2 = 1$ and $l'x^2 + m'y^2 = 1$ will intersect

orthogonally if $\frac{1}{l} - \frac{1}{m} = \frac{1}{l'} - \frac{1}{m'}$.

2) Find the point on the parabola $y^2 = 8x$ at which the radius of curvature is

$$\frac{125}{16}.$$

3) Find the extreme values of the function xy^2z^3 subject to the condition $x + y + z = 6$.

B) If J be a Jacobian of u, v, w with respect to x, y, z and J' be a Jacobian of x, y, z with respect to u, v, w then show that $J \cdot J' = 1$. 4

4. Attempt **any two** from the following : 10

1) Obtain the expressions for the equations of tangent and normal to the curve $y = f(x)$ at any point P(x, y).

2) If $x = f(t)$ and $y = g(t)$ be the equation of a curve in a parametric form then

show that the radius of curvature $\rho = \frac{(x'^2 + y'^2)^{3/2}}{x'y'' - y'x''}$.

3) A rectangular box open at the top is to have a volume of 32 cubic feet, what must be the dimensions, so that the total surface is minimum ?

5. Attempt **any one** of the following : 10

1) Explain Lagranges method of undetermined multipliers to determine the extreme value of $u = f(x, y, z)$ subject to $\phi(x, y, z) = 0$ and hence find the minimum value of $x^2 + y^2 + z^2$ when $x + y + z = 3a$.

2) Obtain expressions for lengths of the tangent, normal, subtangent and sub-normal at any point on the curve $y = f(x)$ and hence show that the sub-normal at any point of the parabola $y^2 = 4ax$ is constant.



4. Answer **any two** of the following. 10

i) What are meristem ? Describe the types of meristem.

ii) Describe in brief the types of wood.

iii) Lenticels structure and function.

5. Answer **any one** of the following. 10

i) Distinguishing character and economic J.M.P. of family meliaceae.

ii) Describe the anomalous secondary growth in Bignonia plant.



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B.Sc. II (Semester – III) (New) Examination, 2015
MATHEMATICS (Paper – VI)
Real Analysis

Day and Date : Wednesday, 27-5-2014
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

Instructions : 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Choose the correct alternative for **each** of the following. **10**

- 1) The seq $\{1, 2, \frac{1}{2}, 3, \frac{1}{3}, 4 \dots\}$ is
- a) bounded below but not above b) bounded above but not below
c) bounded d) convergent
- 2) The number of terms in a sequence are always
- a) finite b) infinite
c) both finite and infinite d) none of these
- 3) If a sequence $\{S_n\}$ is unbounded on the left then the limit point of sequence is
- a) ∞ b) 0 c) 1 d) $-\infty$
- 4) The series $\sum_{n=1}^{\infty} \frac{\sin nx}{n^2}$ is
- a) convergent b) divergent
c) both a and b d) none of these
- 5) A positive term series $\sum \frac{1}{n^P}$ is divergent iff
- a) $P > 1$ b) $P = 1$ c) $P < 1$ d) $P = \infty$



- 6) A negative term series converges iff the sequence of its partial sums is
- a) bounded below b) bounded above
c) both a and b d) none of these
- 7) Every non-empty subset of \mathbb{R} which is bounded has the
- a) infimum b) supremum c) both a and b d) none of these
- 8) If for any $\epsilon > 0$, if $a, b \in \mathbb{R}$ such that $b < a + \epsilon$ then
- a) $b \leq a$ b) $a \leq b$ c) $a = b$ d) $b > a$
- 9) Which of the following set is uncountable ?
- a) Set of integer
b) Set of rational numbers
c) Set of all ordered pairs of integers
d) Set of real numbers
- 10) If A and B be any subset \mathbb{R} then value of $(A \cap B)'$ is
- a) $A' \cup B'$ b) $A' \cap B'$ c) $\supseteq A' \cap B'$ d) $\subseteq A' \cap B'$

2. Attempt **any five** of the following.

10

- 1) State Dedekind's property for real numbers.
- 2) If S and T are subsets of real numbers then show that if $S \subseteq T$ then $S' \supseteq T'$.
- 3) Show that $\lim_{n \rightarrow \infty} \frac{3 + 2\sqrt{n}}{\sqrt{n}} = 2$.
- 4) Define the term monotonic decreasing and monotonic increasing sequence.
- 5) Test the convergence of the series $\sum \frac{1}{n^{1+\frac{1}{n}}}$.
- 6) Show that the series $x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$ converges absolutely for all values of x .



3. A) Attempt **any two** of the following : 6

- 1) If S and T are subsets of real number then show that $(S \cup T)' = S' \cup T'$.
- 2) Prove that every bounded sequence with unique limit point is convergent.
- 3) Show that the series $\sum \frac{1}{n}$ does not converges.

B) Prove that countable union of countable sets is countable. 4

4. Attempt **any two** of the following. 10

- 1) For all real numbers x, y show that $|x + y| \leq |x| + |y|$.
- 2) Show that every convergent sequence is bounded whether converse is true. Justify with example.
- 3) Show that the positive term geometric series $1 + r + r^2 + \dots$ converges for $r < 1$ and diverges for $r \geq 1$.

5. Attempt **any one** of the following : 10

1) Prove that a necessary and sufficient condition for the convergence of sequence $\{S_n\}$ is for each $\epsilon > 0 \exists$ +ve integer m such that

$$|S_{n+p} - S_n| < \epsilon \quad \forall n \geq m \wedge p \geq 1.$$

2) If $\sum u_n$ is positive term series such that $\lim_{n \rightarrow \infty} \frac{u_{n+1}}{u_n} = l$ then show that the

series

- i) converges if $l < 1$
 - ii) diverges if $l > 1$ and
 - iii) test fails if $l = 1$.
-



- 7) The base of ecological pyramid always represents the number of
a) consumers b) predators c) producers d) decomposers
- 8) The _____ diversity includes the communities in a limited field area.
a) Beta b) Alpha c) Gama d) Both a) and b)
- 9) The _____ ecosystem shows detritus type of food chain.
a) pond b) lake c) grassland d) mangrove
- 10) Increasing concentration of _____ in air causes greenhouse effect.
a) SO₂ b) NO₂ c) CO₂ d) O₂

2. Answer **any five** of the following : 10

- i) What are insectivorous plants ? Give two examples of it.
- ii) Define primary and secondary succession.
- iii) What are hydrophytes ? State any two external adaptations of hydrophytes.
- iv) Define α and β diversity.
- v) Define pollution and enlist the types of it.
- vi) What is population density ? Give the formula to calculate it.

3. A) Answer **any two** of the following : 6

- i) Comment on the initial to stages of hydrosere.
- ii) Explain any two qualitative characters of community.
- iii) Write a note on energy flow in ecosystem.

B) Write a note on 'carbon cycle'. 4

4. Answer **any two** of the following : 10

- i) Give an account of abiotic factors of ecosystem.
- ii) Define food chain. Give an account of detritus food chain.
- iii) What are the kinds of pollution ? Add a note on causes of air pollution.

5. Answer **any one** of the following : 10

- i) What is population ? Give an account of age distribution of population.
- ii) Define ecological pyramids. Give an account of pyramid of number.



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B.Sc. (Part – II) (Semester – III) Examination, 2015
ELECTRONICS (New)
Electronics Circuits (Paper – V)

Day and Date : Thursday, 28-5-2015
Time : 11.00 a.m. to 1.00 p.m.

Max. Marks : 50

- N. B. :** 1) **All questions are compulsory.**
2) **Draw the figures wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of calculator is allowed.**

1. Select the correct alternative from the following :

10

i) Ripple factor is defined as the ratio of _____

a) $\frac{V_{rms}}{V_{dc}}$

b) $\frac{V_{dc}}{V_{rms}}$

c) $\frac{V_{rms}}{\pi}$

d) $\frac{V_{dc}}{\pi}$

ii) The stability factor of a BJT circuit is defined as _____

a) $S = \frac{dI_E}{dI_B}$

b) $S = \frac{dI_C}{dI_E}$

c) $S = \frac{dI_C}{dI_{CO}}$

d) $S = \frac{dI_C}{dI_B}$

iii) The basic purpose of filter is to _____

- a) Minimize the variations in ac input signal
- b) Suppress harmonics in rectified output
- c) Remove ripples from the rectified output
- d) Stabilise dc output voltage



- iii) What are the advantages of RC coupled amplifier ?
 - iv) What is cross-over distortion ?
 - v) Give the advantages of negative feedback.
 - vi) What are different types of oscillators ?
3. A) Answer **any two** of the following : **6**
- i) A Weinbridge oscillator has a frequency of 500 Hz. If the value of C is 1000 PF, determine the value of R.
 - ii) What do you mean by multistage amplifier ? Explain it briefly.
 - iii) Explain the working of full-wave centre-tapped rectifier.
- B) Explain working of zener regulator. **4**
4. Answer **any two** of the following : **10**
- i) Explain direct coupled amplifier. Give its advantages.
 - ii) Derive the expression for gain of amplifier with feedback.
 - iii) Explain voltage divider bias circuit.
5. Answer **any one** of the following : **10**
- i) State characteristics of class A, class B, and Class C amplifiers. Explain complementary symmetry amplifier.
 - ii) With circuit diagram explain working of Hartley oscillator. Calculate the oscillation frequency if $C = 0.01 \mu F$ and $L_1 = L_2 = 25 \mu H$.
-